# MECHANISMS OF MOTIVATION: DOES A PERSONAL CONNECTION TO MULTIPLE SCLEROSIS INCREASE MOTIVATION TO PARTICIPATE IN A FUNDRAISING CHARITY EVENT?

A Thesis
by
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**Abstract**

MECHANISMS OF MOTIVATION: DOES A PERSONAL CONNECTION TO MULTIPLE SCLEROSIS INCREASE MOTIVATION TO PARTICIPATE IN A FUNDRAISING CHARITY EVENT?

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The positive health benefits of regular physical activity (PA) and the recommendations to reap these benefits are well established. However, PA levels among the general population are still low despite these well-known benefits. Previous research has demonstrated using a MS PA-based charity fundraising event as a catalyst for PA acts as an ideal PA intervention by fulfilling key concepts of both human motivation and behavior theories, Self-Determination Theory (SDT) and Behavioral Economics (BE), in creating a personal connection to MS and thus increasing intrinsic motivation to engage in PA. SDT states the fulfillment of autonomy, competence, and relatedness increase intrinsic motivation to engage in a particular activity. BE posits humans are not rational decision makers that apply a cost/benefit analysis to decisions, yet humans are susceptible to emotions and short sightedness that influence how they make decisions. The current study aimed to integrate foundational aspects of both SDT and BE theories in a virtual PA program design in an attempt to create a personal connection to MS to increase motivation to adhere to PA engagement. A virtual program was designed to implement a 12-week training program for a virtual 5K run or walk benefitting the National MS Society (NMSS) and a 12-week educational intervention about MS in an attempt to foster a personal connection to MS. Three different 5K training protocols were developed: walk, walk-run, and run to accommodate participants' level of PA. The educational intervention consisted of participants watching a

short video about MS, via the NMSS or TedTalk, and then taking a short comprehensive quiz. Participants were split into one of three groups: with a connection to MS, without a connection to MS, and the control group. Both the connection and no connection to MS participated in the educational intervention. Additional training resources were accessible to all participants; including information on nutrition, warm-up, dynamic stretching, and injury prevention. Program enrollment was designed on a rolling basis, so individuals could start the program and complete their virtual 5K event to their convenience. The goal of this program was to analyze the motivational differences between the connection to MS group and no connection to MS group in order to assess the effectiveness of the educational intervention in creating a personal connection to MS and increasing intrinsic motivation to engage in PA. However, due to situational and environmental barriers, the program had a 84% attrition rate. Thirty-one participants enrolled in the program, and only five participants completed the program. The unexpected attrition rate led the study to shift its focus on analyzing the motivational differences between the completion and dropout group. Both completion and dropout groups noted their initial goals for starting the program was to integrate a PA routine into their lives, both the training and educational interventions were straightforward and easy to understand, and timing of the holidays and winter weather were the two largest barriers throughout the program. The dropout group stated competing demands, such as family and work, took priority over their PA training and thus was the largest barrier to their completion of the program. This assessment led researchers to understand the feasibility of the program design and integral changes to be made to increase intrinsic motivation in long-term adherence to PA engagement.

**Acknowledgments**

Thank you Dr. Fasczewski, Dr. Powell, and Dr. Collier for all the support & guidance throughout this process. Thank you to my family & friends.

## Dedication

In loving memory of Joyce Bramblett.

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## Introduction

Physical activity (PA) provides numerous health benefits, and the adherence to long-term PA lowers the risk of developing metabolic disease, decreases risks of developing mental health issues (chronic stress, anxiety, and depression), and increases overall quality of life (Baillot et al., 2015; CDC, 2021; Ács et al., 2020). It is recommended that adults should participate in at least 150-300 hours of moderate-intensity aerobic PA, or at least 75-150 vigorous-intensity PA levels every week (WHO, 2020). Those who engage in more PA see more health benefits (WHO, 2020). Globally, 28% of adults over the age of 18 do not meet weekly PA recommendations (WHO, 2020). This physical inactivity contributes to increased risks of heart disease, type 2 diabetes, various cancers, decreased quality of life, and overall increase in mortality (Warburton et al., 2006). Therefore, it is vital to understand why individuals are not meeting PA recommendations in order to create effective programs to increase individual's PA levels.

Psychological factors such as motivation can enhance or deter one's ability to engage in PA (Teixeira et al., 2012). The lack of motivation to engage in PA can be explained by two factors. The first factor is when there are many competing demands for an individual's time during the day. These demands include educational, career, and family obligations. Individuals make these competing demands a priority over engaging in PA (Teixeira et al., 2012). The second factor is a lack of competence, the perceived ability to perform a behavior successfully (Edmunds et al., 2006). This lack of competence is either due to the perception of lacking the skill or physical fitness to engage in a PA, thus acting as a barrier for individuals to initiate a PA routine (Teixeira et al., 2012). Research should examine the

underlying factors that contribute to individuals' motivation for PA behaviors to further understand why individuals are not meeting PA recommendations.

Motivation is the activation and persistence of behavior, rooted in intrinsic motivation (Deci & Ryan, 2000). Creating intrinsic motivation is tied to fulfilling concepts in behavioral economics (BE) and self-determination theory (SDT) (Bernhart et al., 2020; Deci & Ryan, 2000).

Behavioral Economics Theory (BE) studies the impact of behavior that is influenced by cognitive, psychological, and social factors (Zeiler & Teitelbaum, 2018). BE predicts individuals behaviors are not driven by rational cost/benefit analysis and decision making, but rather individuals are susceptible to emotions, shortsightedness, and other irrelevant factors in their environment (Ariely, 2008; Laibson & List, 2015). Key aspects of BE are social norms, framing, and habit formation. Social norms serve as a strong anchor for our behavior, they are bounded by our need for community and social interaction; the perception of social norms can strongly influence an individual's behavior (Ariely, 2008; Zimmerman, 2009). Framing a certain activity as enjoyable, full of social interaction, and personal achievement rather than as an obligation can dramatically change how an individual perceives the activity, thus making them more inclined to participate (Thaler & Sunstein, 2008; Zimmerman, 2009). Past behaviors serve as a strong anchor, therefore formulating habits predict an individual's future behavior (Zimmerman, 2009). When positive social norms and framing surrounding PA are combined, there can be an increase in the formation of habits in participating in PA. It is imperative to not only examine the role of BE, but also the critical role that motivation plays in influencing behavior and decision making to fully conceptualize the rationale behind human behavior.

Self-Determination Theory (SDT) is an evolving macro-theory on human motivation and behavior. SDT breaks down the difference between intrinsic motivation and extrinsic motivation behind behavior (Ryan & Deci, 2020). Intrinsic motivation is engaging in a behavior because of its inherent satisfaction. Extrinsic motivation is engaging in a behavior to obtain external and tangible rewards. Some extrinsic motivations are controlled, meaning they lack volition, or are less self-determined. While intrinsic motivation and some other extrinsic motivations are autonomous, meaning they have volition, or are more self-determined (Deci & Ryan, 2000; Ryan & Deci, 2020; Teixeira et al., 2012). Extrinsic motivation has sub-components that range from least self-determined extrinsic motivation to more self-determined extrinsic motivation.

SDT's autonomous forms of motivation are based on the idea that human growth and the ability to learn is due to three psychological needs; autonomy, competence, and relatedness (Deci & Ryan, 2000; Teixeira et al., 2012). Autonomy is the feeling of being in control of one's behaviors (Deci & Ryan, 2000; Ryan & Deci, 2020; Teixeira et al., 2012). Autonomy is supported by feeling in control, having choices, and minimizing pressure (Teixeira et al., 2012). Competence is the sense of accomplishment. Competence is enhanced by positive challenges, feedback, and opportunities for growth (Deci & Ryan, 2000; Ryan & Deci, 2020; Teixeira et al., 2012). Relatedness is the perceived sense of belonging and social connection to others, which is tied to the BE construct of social norms (Deci & Ryan, 2000; Ryan & Deci, 2020; Teixeira et al., 2012). If the psychological needs of autonomy, competence, and relatedness are increased then an individual's intrinsic motivation will increase too (Deci & Ryan, 2000; Ryan & Deci, 2020; Teixeira et al., 2012). To internalize motivation, one's perception of engaging in PA must satisfy the three psychological needs.

By using the principles of BE, the development of competence, autonomy, and relatedness becomes fulfilled, thus advancing the development of self-determined motivation for PA (Fasczewski et al., 2021). Utilizing PA-based charity events to create an atmosphere for participants that support and fulfill the concepts of SDT and BE, can increase participants' intrinsic motivation to engage in PA.

Charity events, such as multiple sclerosis (MS) fundraising charity events, can be used as a catalyst to increase PA. For example, a PA-based MS fundraising charity event can simultaneously facilitate the formation of social norms, framing, habits, and satisfy the three psychological needs of competence, autonomy, and relatedness, to increase intrinsic motivation in those who participate (Bernhart et al., 2020). Research shows a personal connection to a cause, specifically MS in a MS fundraising charity event, supports the concepts of social norms and relatedness (Fasczewski et al., 2021). The personal connection to the cause creates an enjoyable social experience while participating in the charity event, thus creating positive framing around participating in PA. The combination of positive social norms and framing can create a habit of engaging in charity events and PA (Bernhart et al., 2020; Fasczewski et al., 2021). In summary, research shows viable evidence that a personal connection to a cause fulfills the key concepts of BE and SDT. Future research should explore if a connection to a cause, and resulting social connections, can be developed in individuals participating in PA-based fundraising charity events, leading to a viable route to creating effective interventions to increase PA engagement. Therefore, the purpose of this study is to investigate the motivational differences in training for a virtual MS charity fundraising event between those with a personal connection to the MS and those without a personal connection to MS using the lens of BE and SDT.

The goal of this study was to investigate if the group with a personal connection to MS would have higher levels of self-determined motivation compared to the group that does not have  a personal connection to MS, and to assess of the implementation of an educational intervention about MS could create a personal connection to MS and thus increase self-determined motivation. The hypotheses state: (1) There will be higher levels of self-determined motivation in the group that has a personal connection to MS compared to the group that does not have a personal connection to MS; (2) The educational training intervention about MS will increase self-determined motivation to participate in training and the virtual event in the group that does not have a connection to MS.

# Literature Review

## Physical Activity

Physical activity (PA) is defined as the voluntary movement of skeletal muscles (WHO, 2020). The most popular forms of physical activity in the United States are walking, weight lifting, running, and swimming (*Sports and Exercise*, 2021). PA provides numerous health benefits: an enhancement of thinking, memory, and judgment, an increase in cardiovascular health, and a decrease in risks for depression and anxiety (WHO, 2020)**.** Globally, one in four people do not meet the recommendations for PA, and individuals who are insufficiently physically active have a 20% to 30% increased risk of death compared to those individuals who are meeting PA recommendation guidelines (WHO, 2020)**.** Between 2001 and 2016, insufficient PA levels rose 5% globally in high-income countries (WHO, 2020). It is imperative to understand the factors that contribute to insufficient PA levels, and to seek innovative ways to increase PA. Motivation, the reason an individual has for acting or behaving in a particular way, is one particular avenue to examine to understand why individuals are not engaging in sufficient PA.

Motivation is critically important to sustain PA and achieve the positive health outcomes associated with PA (Teixeira et al., 2012). Many individuals do not prioritize PA because they are either simply not interested in PA or they do not value the health outcomes of PA. Since PA is not a priority, other competing factors, such as work, school, and family take priority over PA and become barriers to engage in PA (Mailey et al., 2016; Teixeira et al., 2012). The competence and perceived self-efficacy to overcome these barriers is an important factor to increase motivation to engage in PA (Mailey et al., 2016; Teixeira et al., 2012).

## Motivation

### *Behavioral Economics*

Behavioral economics (BE) focuses on aspects that contribute to the determination of human decision making and behavior (Thaler & Sunstein, 2008). BE is derived from the traditional economic model. In the traditional economic model, individuals are rational decision makers, called *homo economicus*, that apply a cost-benefit analysis of all relevant information before making a decision (Hanoch et al., 2017). However, humans are not rational decision makers due to limited information-processing abilities and lack of self-control (Thorgeirsson & Kawachi, 2013). In contrast to the traditional economic mode, BE takes the decision making process into account, analyzing why and how a person makes a certain decision (Hanoch et al., 2017)**.** Apart from the traditional model, BE acknowledges three human behavioral traits: bounded rationality, bounded willpower, and bounded selfishness (Thorgeirsson & Kawachi, 2013). The first trait, bounded rationality, describes humans' limited information-processing abilities. This is in contrast to the ideal and rational "homo economicus" (Thorgeirsson & Kawachi, 2013). Overconfidence and overoptimism are products of bounded rationality (Thaler & Sunstein, 2008). For example, 50% of marriages end in divorce, yet people do not believe they will fall into that statistic on their wedding day. Overconfidence and overoptimism explains human risk taking due to individuals perceived immunity from harm (Thaler & Sunstein, 2008). The second trait, bounded willpower, is due to lack of self-control; individuals do not always make the best choices for themselves for their long-term interests (Thorgeirsson & Kawachi, 2013). Preventative behaviors and sinful goods arise from bounded willpower. An example of preventative behavior is flossing every day to prevent future dental expenses. A sinful good,

for example, is habitually smoking cigarettes every day, with no regards to the future consequences. The third trait, bounded selfishness, is based on self-interest which includes both altruism and spiteful behavior. Altruistic behavior, the selfless desire to help others, includes blood donations or volunteering. Spiteful behavior has no mutual benefit with one performing the behavior or the one facing the consequences (Thorgeirsson & Kawachi, 2013). These three human behavioral traits arise from three more key aspects of BE that influence behavior: framing, social norms, and habit formation.

When a behavior is framed as enjoyable, as one of social interaction, and as a personal achievement rather than a burden, it can greatly influence the individual's decision to engage in that behavior (Zimmerman, 2009). When physical activity is framed as fun and of personal achievement, then it can change an individual's perception of PA as a rewarding experience. This contrasts when a behavior is seen as a burden and an obligation (Zimmerman, 2009). The second aspect, social norms, influence one's perception on how to behave. This is due to others providing information or enacting peer pressure (Thaler & Sunstein, 2008). Social norms diminish the urge of spiteful behavior and increase altruistic behavior (Thorgeirsson & Kawachi, 2013). When participants' alter their PA social norms, it could increase their motivation to participate. Research shows social norms create a sense of community, or belonging (Bernhart et al., 2020). Habits include unconscious behaviors that are activated by environmental cues. They are formed by a learned stimulus or repetitive behavior (Volpp & Loewenstein, 2020). New habits can be changed or created by the means of social norms and framing (Volpp & Loewenstein, 2020)**.** Understanding how social norms, framing, and habit formation influence motivation is an important step to understanding how these three BE concepts can be developed in individuals.

### *Self Determination Theory*

Self-Determination Theory (SDT) is one of the most prominent theories developed to explain intrinsic and extrinsic motivation in physical activity, exercise, and performance settings. SDT is based on the foundations of the *self*, whose task is to assimilate and regulate both external (ie. culture) and internal (ie. emotions) environments (Ryan, n.d.).

SDT is a spectrum of motivation, from least self-determined to most self-determined motivation. Humans internalize external regulations as internal values; this allows them to be intrinsically motivated. However, regulations might be stalled throughout this internalization process, becoming different degrees of regulation, or self-determined behavior (Deci & Ryan, 2000; Vallerand et al., 1992). When motivation becomes more internalized, it becomes autonomous, and self-determined. The SDT spectrum from least-self determined to most self-determined includes: amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic motivation. Amotivation reflects the absence of both intrinsic and extrinsic motivation, characterized by a lack of intent, value, and competence (Deci & Ryan, 2000; Vallerand et al., 1992). Controlled forms of motivation include external regulation and introjected regulation (Ryan & Deci, 2020; Vallerand et al., 1992). Autonomous forms of motivation include identified regulation, integrated regulation, and intrinsic motivation (Ryan & Deci, 2020; Vallerand et al., 1992). See Figure 1.

External regulation, introjected regulation, identified regulation, and integrated regulation are the four components that make up extrinsic motivation (Ryan & Deci, 2020)**.** External regulation behavior is controlled by rewards or punishments, and is the least self-determined type of extrinsic motivation (Deci & Ryan, 2000; Ryan & Deci, 2020; Vallerand et al., 1992). Introjected regulation is slightly more internalized than external regulation, but

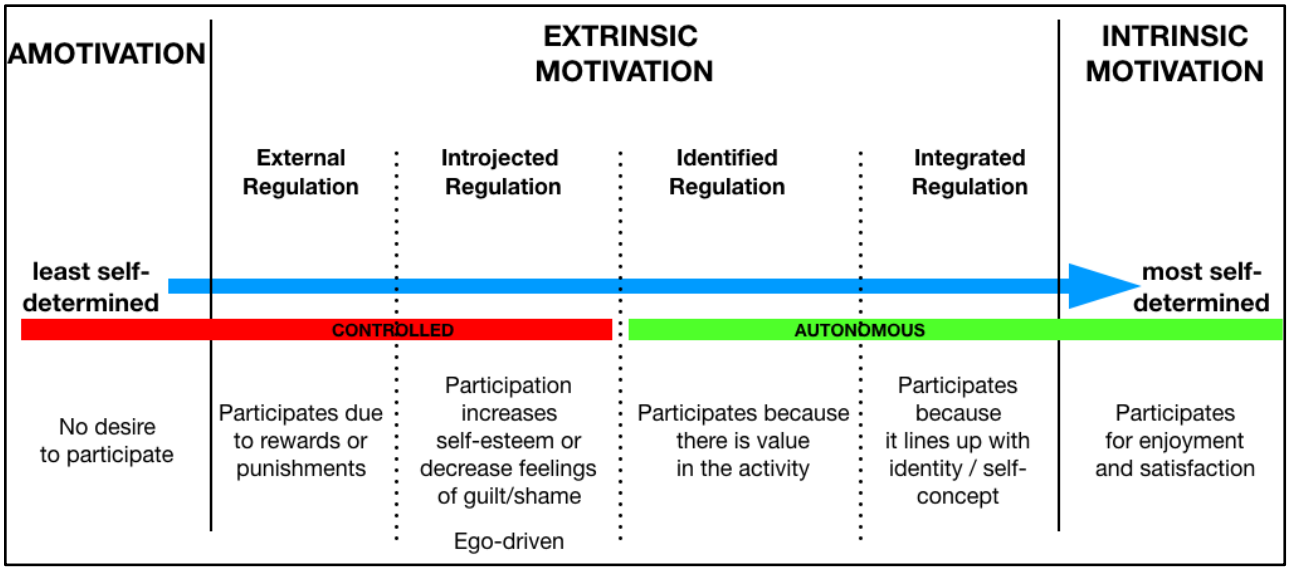
is still controlled. This behavior is ego driven, which is the internal rewards of self-esteem and avoidance of anxiety, shame, and guilt (Deci & Ryan, 2000; Ryan & Deci, 2020; Vallerand et al., 1992). Identified regulation is when an individual consciously identifies with or values a behavior and thus acts on it willingly (Deci & Ryan, 2000; Ryan & Deci, 2020; Vallerand et al., 1992). Integrated regulation is when an individual not only finds value within a behavior, but also finds it to be congruent with other core values the person possesses; the behavior is integrated within a person's self-concept (Deci & Ryan, 2000; Ryan & Deci, 2020; Vallerand et al., 1992). Intrinsic motivation is fully internalized, autonomous, and self-determined motivation; behaviors are performed due to satisfaction and are not dependent on external pressure or incentives (Ryan & Deci, 2020; Vallerand et al., 1992).

Intrinsic motivation serves as the core of the integrated *self,* an integral part of an individual's ability to learn and grow (Ryan, n.d.). Intrinsic motivation is supported by the presence of psychological needs such as autonomy, competence, and relatedness (Ryan, n.d.). SDT defines these psychological needs as the innate psychological core that is needed for psychological growth, integrity, and well-being (Deci & Ryan, 2000)**.** Autonomy is an individual's perception of self-determination, or volition (Ryan & Deci, 2020). The key to intrinsic motivation is perceived autonomy (Ryan & Deci, 2020). The more ownership and choice someone has over a behavior, the more autonomy they experience, therefore there is an increase in intrinsic motivation (Ryan & Deci, 2020). Rewards and threats undermine autonomy, while choice enhances the perception of autonomy (Ryan & Deci, 2020). Competence is an individual's ability to do something effectively (Ryan & Deci, 2020). Positive feedback enhances competence, while negative feedback thwarts the need for

competence and undermines intrinsic motivation (Ryan & Deci, 2020). Perceived competence is the key for any type of motivation (Ryan & Deci, 2020). Relatedness is the desire for social connection and community, which can influence decision making (Ryan & Deci, 2020; Tsai et al., 2021). Research shows that perceived social support about engaging in PA causes an increase in relatedness and an increase in intrinsic motivation to engage in PA (Tsai et al., 2021). Motivation to engage in PA, can be located anywhere on the motivation spectrum (Edmunds et al., 2006), presented in Figure 1.

**Figure 1**

*Self-Determination Theory Motivation Scale*




External regulation is driven by rewards and punishments. In the context of PA, an individual would be externally regulated to participate in PA if a medal was used as a reward. Introjected regulation is when an individual engages in PA to attain ego-enhancement results, like avoiding negative feelings of guilt and seeking social approval. Identified regulation to engage in PA is due to the participant valuing the benefits of PA, but does not enjoy the activity itself. Integrated regulation is when PA is connected to a sense of self, or self-

identity, but the individual still does not completely enjoy PA for the activity itself. Lastly, engaging in PA simply out of the enjoyment that it brings to an individual, is an example of intrinsic motivation to exercise (Edmunds et al., 2006). Research has shown that intrinsic motivation is not the only predictor of motivation to participate in PA, but introjected, identified, and integrated regulation has shown a positive correlation with participating in PA (Edmunds et al., 2006). Furthermore, research found a negative correlation between external regulation and participation in PA (Edmunds et al., 2006).

Along with increasing self-determined motivations, participation in PA can also fulfill the psychological needs of autonomy, competence, and relatedness. Autonomy is central to intrinsic motivation and the self-determined forms of extrinsic motivation (Edmunds et al., 2006). Competence and relatedness promote motivation in the least self-determined forms of extrinsic motivation (Edmunds et al., 2006). Research found when choice is provided (autonomy) it results in an increase in intrinsic motivation to engage in PA (Edmunds et al., 2006; Tsai et al., 2021). Additionally, when competence and relatedness is fulfilled, intrinsic motivation to engage in PA increases (Tsai et al., 2021).

Self-efficacy is highly tied to an individual's confidence in engaging in PA (Sweet et al., 2012). Outcome expectations influence an individual's self-efficacy; an individual's positive or negative perceptions of outcomes pertained to participating in PA (Bandura, 2004). Outcome expectations influencing an individual's self-efficacy, or confidence, in engaging in PA is highly tied to fulfilling the SDT construct of competence (Sweet et al., 2012). Research shows outcome expectations predicted confidence, or self-efficacy, to engage in PA, and this increase in self-efficacy increased self-determined motivation and increased the likelihood of engaging in PA (Sweet et al., 2012).

Research concludes when individuals engage in PA with these three psychological needs fulfilled then it will increase intrinsic motivation (Edmunds et al., 2006; Tsai et al., 2021). It is critical to fulfill these psychological needs in order to internalize motivation and become more self-determined in the behavior. Reinforcing the constructs of BE (social norms, framing, habits) in individuals participating in PA, will create more competence, autonomy, and relatedness and internalize motivation.

### *PA-based Charity Events*

In 2017, American citizens gave $410 billion to charities, a 5% increase from 2016 (Online Giving Statistics, Trends & Data, 2018). 56% of worldwide charity donors regularly attend charity fundraising events (*Nonprofit Fundraising Statistics*, 2021). Charity fundraising events take on a large variety of forms (walk, run, cycle, or swim) and distances (5l, 10k, marathon, or triathlon). The National Multiple Sclerosis Society (NMSS) provides multiple types of fundraising charity events to choose from: walk, bike, and do it yourself where participants can create their own event.

**Multiple Sclerosis.** MS is a chronic, incurable, neurodegenerative, disease of the central nervous system that results in a wide range of debilitating symptoms, including fatigue, pain, muscle weakness, balance dysfunction, and depression (Compston & Coles, 2008; Klaren et al., 2013). MS has a prevalence of 1 per 1000 persons in the United States (Klaren et al., 2013). The NMSS has invested $974 million into MS research since 1946 (*How We Fund Research*, 2021). NMSS has three main goals in research: stop the disease in its tracks, restore lost function, and end MS forever (*How We Fund Research*, 2021). Research has found numerous PA benefits for individuals who live with MS, including positive effects on muscle strength, walking, gait, balance, quality of life, and overall quality

of life (Klaren et al., 2013; Motl et al., 2017). However, less than 20% of the adults with MS meet the weekly PA requirements (Compston & Coles, 2008; Klaren et al., 2013).

**MS Fundraising Charity Events and Behavioral Economics.** Research specifically exploring the relationship between self-determined motivation and BE in PA-based MS fundraising events, found that three aspects of BE (ie. framing, social norms, and habit formation) are tied to motivation for participation in these events (Fasczewski et al., 2021). This research specifically used Multiple Sclerosis (MS) charity events to explore the ties between motivation and BE. Participants who have a personal connection to MS, either whether they have it or are connected with someone who does, had an increased positive experience of social connections and social norms (Fasczewski et al., 2021). Thus, participation in PA for the MS fundraising event was framed as an enjoyable experience due to those factors (Fasczewski et al., 2021). Therefore, the desire to continue participating, or habit formation, and intrinsic motivation to participate in PA and future MS fundraising charity events all increased (Fasczewski et al., 2021). Another study examining the role of motivation in a Bike MS fundraising charity event, noted that social connections were a strong motivator for participation (Fasczewski, Cook, et al., 2020). Additional research concerning for-cause charity event participation, has shown that framing a for-cause event as an enjoyable time increases motivations to participate in that event (Bernhart et al., 2020).

**MS Fundraising Charity Events and Self-Determination Theory.** Research shows PA-based charity events are also tied to an increase in the three psychological needs in SDT: autonomy, competence, and relatedness (Bernhart et al., 2020). Autonomy is increased in the ability to choose how to participate in a single charity event; the participant can decide the distance (ie. 3K, 5K, or 10K) and how they participate (ie. walk, run, or cycle) (Bernhart et

al., 2020). The need for competence is fulfilled by participants overcoming challenges and completing the event (Bernhart et al., 2020). Lastly, research has concluded that participation in a charity event fulfills the need for relatedness by bringing friends and family together, creating a sense of community (Bernhart et al., 2020). Research looking at participants diagnosed with MS participating in a Bike for MS fundraising charity event, found that participation gave them an increased sense of autonomy, competence, and relatedness (Fasczewski, Cook, et al., 2020). Autonomy was increased due to the perceived control over MS, competence was increased by the improvement of their symptoms via cycling, and relatedness was increased by the supportive family-like environment of being on a team (Fasczewski, Cook, et al., 2020). This research concluded the participants' motivation to participate in the bike event became internalized due to these three psychological needs being satisfied (Fasczewski, Cook, et al., 2020). Recent research found participants without MS more likely to continue participation in PA-based MS fundraising events if they had a personal connection to MS (Fasczewski et al., 2021). This research concluded the personal connection to MS increased the participants' social connections and social norms, creating positive framing and habits, and increasing intrinsic motivation to participate (Fasczewski et al., 2021).

The above-mentioned literature tied the fulfillment of key concepts of BE and SDT to an increase in participating in PA-based fundraising charity events. These key concepts are further satisfied when an individual has a personal connection to the PA-based fundraising charity event. To the authors' knowledge, there is no current research on the concepts of BE and SDT, that are demonstrated with a connection to the cause, can be developed within an individual. If these concepts can be developed within an individual, this would lead to

practical future interventions to increase PA engagement. The current study will expand on existing literature by creating an intervention to utilize MS charity fundraising events to further understand the roles of motivation via the lens of BE and SDT.

## Methods

### Participants

Any individual with or without MS, over the age of 18, physically able to participate in a 5K run or walk, and reported to be not sufficiently physically active or not at all physical activity, as defined by the ACSM recommended guidelines was eligible for participation. ACSM guidelines state an active adult is one that participates in at least 150-300 hours of moderate-intensity aerobic PA, or at least 75-150 vigorous-intensity PA levels every week (Riebe et al., 2018). Exclusion criteria included: participating in an organized event in the past year, currently meeting high physical activity levels per ACSM guidelines for at least one year prior to the start of this program, history of competitive running, regular recreational runner, and completion of a walk or run event in the past year. See Appendix A for Screening Questions.

### Measures

An enrollment form was filled out by all participants who passed the screening and wanted to continue with the program, this form included consent and basic demographic information. Basic demographic information collected from participants included age, height, weight (to calculate Body Mass Index; BMI), gender, race/ethnicity, level of education, employment status. See Appendix B for Enrollment Form.

#### *Godin Leisure Time Exercise Questionnaire*

Pre-participation PA was evaluated using the self-reported Godin Leisure Time Exercise Questionnaire (Godin). Godin is a self-administered 4-item questionnaire that categorizes weekly PA based on frequency and intensity into three categories: light, moderate, and vigorous exercise (Amireault et al., 2015; Godin & Shepard, 1985). The

weekly PA scores are scaled into three categories: *active* (>24), *moderately active* (14-23), and *insufficiently active/sedentary* (<14) (Godin & Shepard, 1985). Test-retest analysis demonstrated reliability at 0.97 (Sari & Erdoğan, 2016). See Appendix C for Godin.

***Patient Determined Disease Step***

Participants with MS completed the 8-point Patient Determined Disease Step (PDDS) self-reported scale on the severity of their MS symptoms; 0 being functioning normal with no limitations on activity or lifestyle and 8 being the most severe manifestations of MS symptoms (Hohol et al., 1995, 1999). PDDS demonstrated a strong correlation with its previous version, the Expanded Disability Scale (EDDS), p=0.783; thus, supporting the validity of PDDS (Learmonth et al., 2013)**.** See Appendix D for PDDS.

***Multiple Sclerosis Knowledge Survey***

A 14-itemed multiple choice question survey was administered pre-training to test the participants' knowledge on what MS is and the importance of MS fundraising charity events. The survey was administered again post the virtual event, to assess the effectiveness of the MS Educational Training Intervention. Participants with a connection and no connection to MS will partake in the survey, the control group will not. The survey was developed using information from the NMSS website's educational brochures. See Appendix E for MS Knowledge Survey.

***BREQ-3***

The Behavior and Regulation in Exercise Questionnaire 3 (BREQ-3) was used to measure the spectrum of SDT motivational factors. BREQ-3 asks 24 questions on a scale of 0-4; 0 being *not true to me* and 4 being *very true to me* to measure amotivation, external regulation, introjected regulation, identified regulation, integrated regulation, and intrinsic

motivation (Cid et al., 2018). BREQ-3 scores were summed into a single score using a relative autonomy index (RAI) to determine the degree at which an individual feels self-determined. Positive scores equal higher relative autonomy, or more self-determined behavior; negative scores equal more controlled behavior, or less self-determined behavior (Chemolli & Gagné, 2014). Composite reliability has been demonstrated as $\geq 0.70$ and validity as $p<0.05$ (Cid et al., 2018). See Appendix F for BREQ-3.

***Self-Efficacy for Exercise Scale***

The Self-Efficacy for Exercise Scale (SEE) is a self-report measure that was administered to assess the participants exercise self-efficacy (Resnick & Jenkins, 2000). SEE asks individuals to rate how confident they are on a scale of 1-10 to exercise three times per week for 30 minutes in the face of 9 different barriers to exercise; 1 being *not confident at all* and 10 being *very confident*. SEE total score is calculated by summing the responses to each question. The range of the SEE score is from 0-90; a higher score indicates higher self-efficacy. Initial reliability and validity tests have been performed for SEE, with validity confirmed and reliability at 0.90 (Resnick & Jenkins, 2000). See Appendix G for SEE.

***Post-Intervention Questionnaire***

Post-intervention questionnaire was administered via Qualtrics for all participants. This questionnaire included the *Multiple Sclerosis Knowledge Survey* that was administered prior to the start of the intervention. The purpose of this was to test the effectiveness of the *Multiple Sclerosis Educational Training Intervention*. BREQ-3 and SEE were administered again to assess any changes in SDT motivation and self-efficacy. Questions regarding the perceived usefulness of the additional training resources were also part of the post-interventional questionnaire. Participants who stopped training, for any reason or for any

length of time, were allowed to continue the intervention. Lastly, nine open-ended BE framed questions were in the post-intervention questionnaire to further explain the relationship between the MS Educational Training Intervention, motivation, and participation in the virtual event training and virtual event itself between the three groups. The BE questions focused on: (1) the participants initial interest and motivation to take part in this training for a virtual MS fundraising charity event, (2) the participants perceptions towards PA, and (3) the participants perception on the impact of MS fundraising charity events (Bernhart et al., 2020; Fasczewski et al., 2021). See Appendix H for Post-Intervention Questionnaire.

### *Post-Intervention Phone Interview*

A phone interview was offered to participants who either completed or dropped out of the program. These interview questions were open-ended and conversational in style. These questions asked if this program met the participants' PA and motivational goals and what the participants thought could be improved to better meet their needs. If the participants were involved in the MS Educational Training Intervention component of the program, they were asked questions to assess the effectiveness of the educational modules and how they could be improved. Participants were asked what part of the program seemed difficult and if they experienced any barriers or problems throughout the program. Lastly, participants were asked if being part of this program increased their motivation to continue engaging in PA. See Appendix I for Post-Intervention Phone Interview.

## Procedures

After the screening process, all participants filled out the Enrollment Form that consisted of a consent form and basic demographics. From then, the program facilitator split participants up in either one of the experimental groups, connection and no connection to

MS, or the control group. The two experimental groups received an initial email with the link to the pre-intervention *Multiple Sclerosis Knowledge Survey*, pdf's of the three training protocols, link to additional training resources, Zoom link for the optional weekly check-ins, link to Google Site, and instructions on how to navigate Google Site. The control groups initial email consisted of pdf's of the three training protocols, link to the additional training recourse, and a Zoom link for the weekly check-ins. See Appendix J for Initial Email Script. A breakdown of the procedures is shown in Figure 2.

All three groups were provided a 12-week PA Charity Event Training Protocol via email with three 5K training protocols: walk, intermediate, or run. Participants decided which type of training protocol they wanted to participate in, depending on their perceived PA levels, thus allowing for perceived autonomy. Post screening, all participants notified the program facilitator on the phone or by email which training protocol they chose. Weekly emails were sent to both experimental and control groups to remind them of their training, optional weekly Zoom check-ins, and additional training resources. The experimental groups weekly email also reminded them of the weekly modules and quizzes found on Google Sites. Phone interviews were conducted on participants, if they consented to participating, either post their completion of the virtual 5K event or post their dropout of the 12-week training program. See Appendix K for Phone Interview Consent Form. The control group received the link to the Google Site after the completion of the virtual 5K event. Confidentiality of participants was kept by giving each participant a coded identifier.

### *Multiple Sclerosis Educational Training Intervention*

An education training intervention about MS was administered to participants, aside from the control group. See Appendix L for MS Educational Training Intervention. This

intervention was given after the completion of the entrance *Multiple Sclerosis Knowledge Survey* and throughout the 12-week training for the virtual event. The MS Educational Training Intervention protocol was posted on Google Site along with the Charity Event Training Protocol. See Appendix M for Google Site. Each week the education training included one module about MS, a short video provided by either the NMSS or TedTalk, and a short comprehensive quiz given via Google Forms. Emails were sent weekly to participants to remind them to complete the weekly modules and quizzes on the Google Site. See Appendix N for Weekly Email Script.

### *Charity Event Training Protocol*

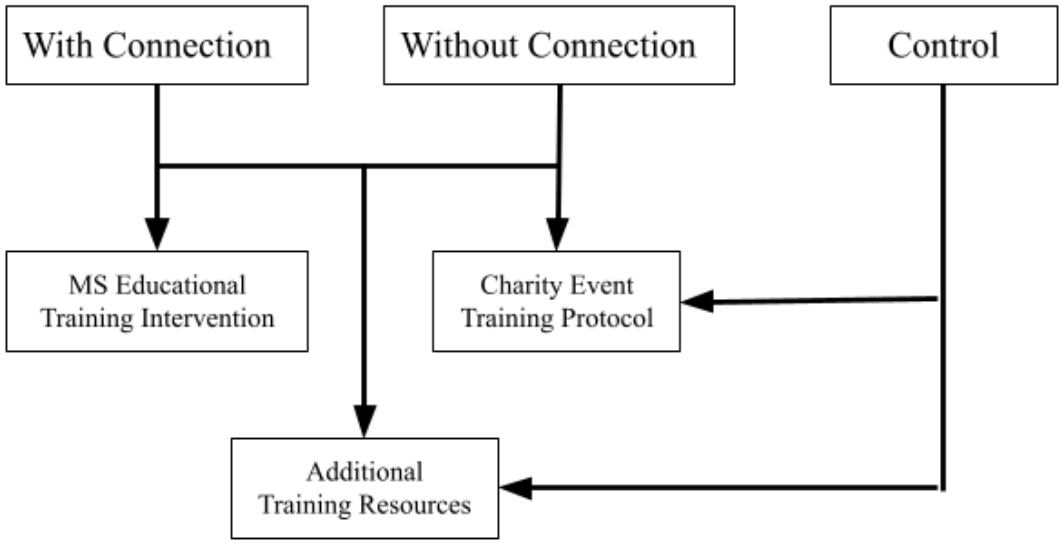
There were three 12-week 5K training protocols for the virtual MS event: walk, intermediate, and run. See Appendix O for Charity Event Training Protocol. Participants were able to decide which training protocol they wanted to follow, based on perceived PA ability. The training protocol incrementally increased over the course of 12-weeks to prepare participants to walk or run the 5K.

### *Additional Training Resources*

Participants were provided additional training resources they could reference to answer questions throughout the 12-week training protocol. Additional training resources included a variety of useful information the participants could utilize if they had questions about stretching, warm-up, nutrition, injury prevention, and more. See Appendix P for Additional Training Resources.

**Figure 2**

*Flow Chart of Each Condition and Procedures*




**Data Collection**

The training protocol began whenever participants passed screening, received all information, and wanted to start the training protocol. Entrance data were collected using an anonymous online survey via *Qualtrics*. Participants were split into three groups: one with a personal connection to MS, one without a personal connection to MS, and the control group. Researchers attempted to use stratified random sampling to ensure a balance of age and ability when dividing participants into one of the three groups.

Participants were screened for eligibility prior to participation by phone call. Participants' names, email, phone numbers, and answers to the screening questions were collected in an excel document. During the screening process, participants were given information involving the study, *Multiple Sclerosis Educational Training Intervention*, *Charity Event Training Protocol*, additional training resources, and how to navigate Google Site.

To aid in the continual development of a feasible program, the facilitator of the research took notes throughout the duration of data collection about observations made during participants' involvement in the 12-week training program. These notes were taken throughout the process as observations on issues that were arising for participants. Some notes were used to revise parts of the program in attempts to keep participants engaged. For example, participants were encouraged to view the program as flexible to their schedule and to repeat weeks if they needed to. This strategy was used when participants came forward that they would drop out of the program because they missed one week of training. Small program adjustments were made as issues arose, such as wording adjustments to the weekly email reminder and addition of check-in emails. Wording adjustments to the weekly email reminder included noting the participants falling behind on the educational intervention modules and reminding the participants what week of training they were about to start. See Appendix Q for Weekly Check-In Emails.

***Data Analysis***

Descriptive statistics and all quantitative measures were analyzed using SPSS version 26 (*IMB Corporation, 2020)*. Results of the Godin, PDDS, MS Knowledge Survey, and BREQ-3, SEE, Post-Intervention Questionnaire, and Post-Intervention Phone Interview were provided. Independent T-Test analysis was used to look at the difference in Godin, MS Knowledge Survey, BREQ-3, and SEE between the completion group and dropout groups. Minimal difference (MD) was used to analyze the completion group's individual entrance and exit scores of the MS Knowledge Surveys, SEE, and RAI. For the completion group, the opened-ended BE questions were categorized into overall themes and frequency of each theme was given. The post interview phone interview responses were categorized into overall

themes and impressions between the completed and dropout groups using a qualitative approach (Sandelowski & Barroso, 2006). Researchers analyzed data to make sure there were no differences in motivation between the three different 12-week training protocols between participants by using Independent Sample T-test analysis.

## Results

The *Institutional Review Board* at Appalachian State University approved this intervention prior to the collection of any data. Participants were recruited via social media (*Facebook, Instagram*), email announcements, and flyers at ASU, and through MSBS, a MS self-help group based in Winston-Salem, North Carolina. The recruitment process began late August. Data analysis began mid-March.

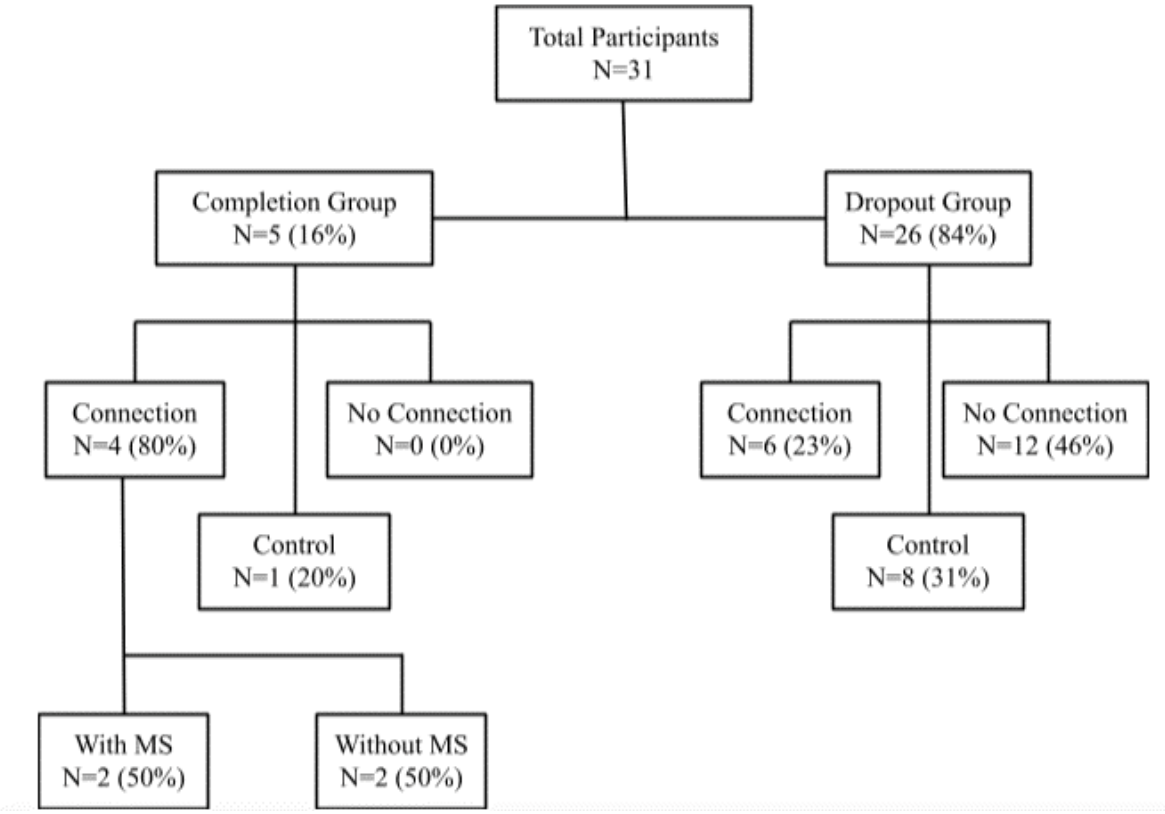
The primary aim of this study was to determine motivational differences in training and participation in a for-cause charity event between individuals with a personal connection to a cause and individuals with no personal connection to a cause. Due to the high dropout rate in all conditions, the results are focused on the difference between the group that completed the program and the dropout group.

### Quantitative Results

Of the 36 participants that passed the screening process, 31 (86%) participants completed the enrollment and entrance questionnaires. From these participants, 10 (32%) were placed in the connection to MS group, 12 (39%) were placed in the no connection to MS group, and 9 (29%) were placed in the control. Participant groupings are shown in Figure 3.

**Figure 3**

*Flow Chart of Participant Groupings*




Age and BMI of both completion and dropout participants are presented in Table 1. Participants' gender and race are presented in Table 2. Participants had a 100% employment status, including both full time and part time. Participants were from 5 states and 2 countries (US and Canada). Participants' highest level of education is presented in Table 3. In the completion group, there were 2 participants living with MS, with PDDS scores of 2 and 3, indicating functional mobility with some deficits.

**Table 1**

*Age and BMI of Completion and Dropout Participants*

| Measure | Completion (mean +/- SD) | Dropout (mean +/- SD) |
|---|---|---|
| Age | 49.20 +/- 7.36 | 33.46 +/- 13.99 |
| BMI | 27.67 +/- 4.58 | 27.61 +/- 4.98 |

**Table 2**

*Gender Identity and Race/Ethnicity of Completion and Dropout Participants*

| Measure | Total N ; % | Completion (N ; %) | Dropout (N ; %) |
|---|---|---|---|
| Female | 27 (87.1%) | 5 (18.5%) | 22 (81%) |
| Non-Binary / Gender Non-Confirming | 3 (9.7%) | 0 (0%) | 3 (100%) |
| Male | 1 (3.2%) | 0 (0%) | 1 (100%) |
| White | 29 (93.5%) | 4 (14%) | 25 (86%) |
| Hispanic / Latino | 2 (6.5%) | 1 (50%) | 1 (50%) |

**Table 3**

*Level of Education of Completion and Dropout Participants*

| Measure | Total N ; % | Completion (N ; %) | Dropout (N ; %) |
|---|---|---|---|
| Bachelor's degree | 10 (32.3%) | 3 (30%) | 7 (70%) |
| Some undergraduate credit but no degree | 7 (22.6%) | 0 (0%) | 7 (100%) |
| Master's degree | 6 (19.4%) | 2 (33%) | 4 (66%) |
| Doctoral degree | 3 (9.7%) | 0 (0%) | 3 (100%) |
| Associate's degree, | 3 (9.7%) | 0 (0%) | 3 (100%) |
| Some type of trade, technical, or vocational training | 1 (3.2%) | 0 (0%) | 1 (100%) |
| Professional degree | 1 (3.2%) | 0 (0%) | 1 (100%) |

Results for quantitative measures show no significant ($p$>0.05) difference in entrance GODIN, SEE, and RAI scores between the completion and dropout groups, results shown in Table 4. Entrance and exit SEE and RAI scores were analyzed in the group that completed the program, results shown in Table 5. Minimal difference (MD) was calculated to see the minimal changes between these values. MD for SEE was 20.48 and MD for RAI was 5.865; the drop in SEE and RAI scores from entrance to exit scores are not statistically significant.

**Table 4**

*Quantitative Entrance Data of All Participants*

| Measure | Completion (N) | Completion (mean+/-SD) | Dropout (N) | Dropout (mean+/-SD) | t-values | p-values |
|---|---|---|---|---|---|---|
| GODIN | 5 | 18.6 +/- 14.19 | 26 | 23.5 +/- 21.26 | -0.491 | 0.245 |
| SEE | 4 | 51 +/- 20.7 | 25 | 49.6 +/- 13.00 | 0.193 | 0.448 |
| RAI | 4 | 6.47 +/- 5.67 | 26 | 8.28 +/- 5.75 | -0.645 | 0.650 |

**Table 5**

*Quantitative Entrance and Exit Data of Completed Participants*

| Measure | Entrance (mean+/-SD) | Exit (mean+/-SD) | t-values | p-values |
|---|---|---|---|---|
| SEE | 51.00+/-20.7 | 42.80+/-12.07 | 0.765 | 0.558 |
| RAI | 6.47+/-5.66 | 4.00+/-4.85 | 0.740 | 0.992 |

The 14-itemed MS Knowledge Survey Results from the entrance questionnaire were compared between the completion and dropout groups, showing no significance ($p$>0.05). Furthermore, the entrance MS Knowledge Survey results were compared between the connection and no connection groups, showing no significance ($p$>0.05). Lastly, the entrance and exit MS Knowledge Survey results were compared between the participants that completed the program, showing no significance ($p$>0.05). MS Knowledge did not significantly change in any of these comparisons. All results of the MS Knowledge Survey are shown in Table 6.

**Table 6**

*MS Knowledge Survey Results*

| Measure | Completion (N) | Completion (mean+/-SD) | Dropout (N) | Dropout (mean+/-SD) | t-values | p-values |
|---|---|---|---|---|---|---|
| Entrance results between completion and dropout | 4 | 89.29 +/- 7.14 | 18 | 80.95 +/- 8.49 | 1.816 | 0.445 |
| Entrance results between connection and no connection | 10 | 82.86 +/- 10.31 | 12 | 82.14 +/- 7.77 | 0.186 | 0.274 |
| Entrance and Exit Results in Completion | 4 | 89.29 +/- 7.15 | 3 | 92.86 +/- 7.14 | -0.775 | 0.537 |

## Qualitative Results

### *Exit Questionnaire*

**General Exit Questions.** General questions about participants' previous knowledge about MS, involvement with MS charity events, and utilization of additional training resources were asked to the 5 participants that completed the program, responses shown in Table 7. Two (40%) of completed participants heard about the program via email announcements, 2 (40%) via virtual flyers, and 1 (20%) heard about the program through a friend. Three (60%) individuals utilized the additional training resources. Out of the individuals that did utilize these resources, two (67%) said they viewed them 1-2 times total,

and one (33%) said they used them every week (9-12 times total); the specific additional training resources participants did utilize is shown in Table 8.

**Table 7**

*General Exit Questionnaire Responses*

| Theme/Description | N | % |
|---|---|---|
| Heard of NMSS prior to participation in program | 4 | 80% |
| Virtual 5K changed perception of physical activity | 4 | 80% |
| Additional training resources utilized | 3 | 60% |
| Previously participated in MS charity event | 2 | 40% |

**Table 8**

*Additional Training Resources Utilized*

| Theme/Description | N | % |
|---|---|---|
| Exercise Facts | 3 | 60% |
| Staying Hydrated | 3 | 60% |
| Dynamic Warm Up | 1 | 20% |
| Helping You Stay Fit | 1 | 20% |
| Combating Shin Splints | 1 | 20% |
| Running Form | 0 | 0% |
| MyPlate | 0 | 0% |
| Injury Protocol | 0 | 0% |

When asked, all participants noted they plan to continue to exercise in the future. Some individuals specifically stated this "program helped me establish a running/workout

habit" due to their completion of the program; One participant said, "This program gave me the boost to push myself to walk farther again than I was lately in the habit of walking." Participants were asked a series of questions on a scale of 1-10, 1 being "not confident at all" or anything negative and 10 being "very confident" or anything positive. All but the control participant completed this part of the exit questionnaire. Mean and standard deviation of answers seen in Table 9.

**Table 9**

*Exit Questionnaire Scale Questions*

| On a Scale of 1-10 | Mean +/- Standard Deviation |
|---|---|
| Overall satisfaction with outcome of the training program | 7.4 +/- 3.70 |
| What degree has this program positively impacted your PA / exercise participation | 8.5 +/- 1 |
| How much do you feel your knowledge about MS increased as a result of participating in the MS educational intervention | 7.4 +/- 1.95 |
| How likely are you to continue to support the NMSS moving forward | 6.8 +/- 2.17 |
| How helpful did you find the additional training resources | 7 +/- 2.45 |
| I believe completing this event, and similar events, positively impacts those with MS | 7.6 +/- 2.51 |
| I plan to continue participating in MS fundraising events | 6.6 +/- 2.30 |

**Open Ended Behavioral Economics Questions.** The exit questionnaire for completed participants incorporated nine BE focused questions. These asked a range of questions from the participants initial interest, motivation, personal goals to start this program, the barriers they faced while in the program, the most helpful parts of both the training and educational program, what could be improved in both the training and

educational program, the participants perception of PA as being part of the program, and the participants biggest accomplishments and proudest moments in their involvement in the program. See Appendix S for themes and frequencies of the nine BE questions. The last question was open-ended to allow participants to add any comments about the program. One participant said the program was "a great motivator for me to exercise." Another participant bought themselves a medal to award themselves for their completion of the virtual 5K event. Lastly, one participant commented they viewed the program as a great way to "to help people get out of their comfort zone and start moving. MS or not we all need to keep our bodies going."

***Email Dropout Reasons***

Out of the 26 participants that dropped out, 16 (62%) emailed the program facilitator to explain the reason for dropping the program. Out of these 16 participants, one (17%) was from the connection group, 12 (75%) were from the no connection group, and three (50%) were from the control group. The most common reason for these individuals dropping out of the study was "due to the holidays and the weather." Other reasons for dropping out included physical injury, mental health, and competing demands such as educational, career, and family obligations. These reasons for dropping were seen in all three groups: connection, no connection, and control. Themes and frequencies of reasons for dropout via email explanation are in Table 10.

**Table 10**

*Email Dropout Reasons*

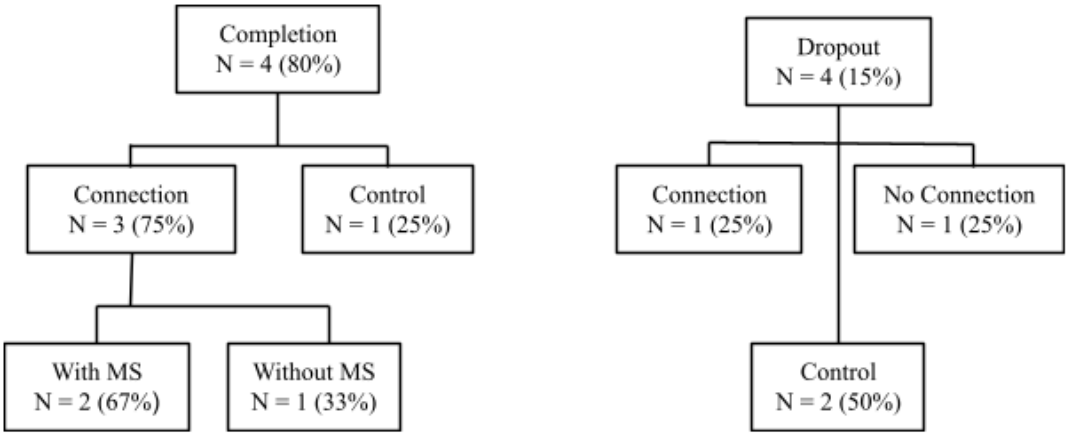
| Theme | N | % |
|---|---|---|
| Competing Demands | 10 | 62.5% |
| Weather | 2 | 12.5% |
| Holidays | 2 | 12.5% |
| Physical Injury | 2 | 12.5% |
| Mental Health | 1 | 6.25% |

### *Phone Interview Overall Impressions*

Four (80%) participants from the completion group and four (15%) participants from the dropout group consented to participate in the post-intervention phone interview. Participant breakdown shown in Figure 4. From the completion group, three (75%) were from the connection to the MS group, and one (25%) was from the control group. From the dropout group, one (25%) was from the connection with MS group, one (25%) was from the no connection to MS group, and two (50%) were from the control group. Three main themes came out of the phone interviews: goals for starting the program, barriers that arose during the program and how to transform the program to help participants overcome these barriers, and how this program has impacted participants' PA engagement.

**Figure 4**

*Flow Chart of Post-Intervention Phone Interview Participant Breakdown*




**Theme 1: Initial Goals for Starting the Program.** The first theme to arise from the phone interviews were the participants' initial goals for starting the program and the goals they set for themselves throughout the program. Participants in the completion group indicated their initial goals for starting the program were to get back into having an active routine. Some participants stated they joined this program because they "wanted to start getting back out there " and "wanted to get back into running." Another participant added that joining this program would "be a good motivator for me if I had to be on a certain schedule or accountable." Participants in the dropout group had similar initial goals as the completion group for starting the program. One dropout participant thought "it would be a good program to help me consistently exercise because I was struggling to get a routine in place."

Participants from the completion group noted the goals they set for themselves as being part of this program was "being more active," training consistently, and "to just not

quit." While the participants in the dropout groups set goals for themselves in the program was to adhere to the program and "just trying to do what the program asked for."

**Theme 2: Transforming Program to Overcome Barriers.** The second theme to arise from the phone interviews were barriers the participants faced throughout the program and suggestions on how the program can be improved to help participants overcome these barriers. The main barriers included: holiday disruption, cold weather, competing demands, and program design. When asked about barriers to participation, the completion group indicated the timing of starting the program around holidays was noted as the largest barrier and weather as the second largest barrier. One completion participant stated "between weather and holidays, I'd say that was the hardest part." The largest barriers for the participants in the dropout group were competing demands for time, such as work, commuting, family obligations; others noted physical illness as a barrier, such as contracting COVID-19. This group found it difficult to integrate the program in their everyday lives. One dropout participant stated "Finding the time for exercising" was difficult "especially [since] I have never run in my life, so I didn't really know how to start."

Participants in both groups felt the training program structure was accessible, easy to follow, and flexible, and enjoyed the weekly email reminders. However, a few participants noted they missed the social aspect of training. A few completion participants stated "missed the people aspect of it" and wanted "some way to connect people, even virtually, share a leaderboard or congratulate each other or become friends on Fitbit" to help motivate themselves during a rough week of training. Participants in both groups felt the educational intervention's structure was straightforward and easy to follow. However, few participants from both completion and dropout groups indicated either the training or educational

program design were not engaging enough. One participant from the dropout group suggested “having more variety in exercising is more motivating than doing every week following almost the same routine.” This participant went on to say they felt the program “was more intended for people who already had experience running or they already had established an exercise routine” and would have benefited from one-on-one “initial sessions” to present the training program to participants “in a way that they can incorporate it in their lives.” Furthermore, the participants with MS felt the educational interventions were directed towards newly diagnosed individuals with MS.

**Theme 3: Physical Activity Engagement.** The final theme to arise from the interview was participants' perception on how this program has impacted their motivation to engage in PA. The completion group overwhelmingly stated their PA “dramatically increased.” One participant noted this program gave them the foundations to continue running and train for a half marathon. Participation in this program gave the dropout group a realization that they should be engaging in more PA activities by helping them realize they “should be getting up and doing more.”

## Discussion

The purpose of this study was to investigate if individuals with a personal connection to MS would have higher levels of self-determined motivation for PA compared to individuals without a personal connection to MS, and to assess if the implementation of an educational training intervention about MS could create a personal connection to MS and thus increase self-determined motivation. To examine this, a 12-week training program was designed for a Virtual 5K event benefiting the NMSS. Embedded in this training program was an educational intervention about MS in an attempt to create a personal connection to the cause.

Due to situational and environmental barriers, there was an unpredicted high attrition rate. Therefore, to assess the feasibility of the program design, including both the training program and educational intervention, the analysis of the study shifted its focus to understanding the reasons for the high attrition rates of participants. This program had an attrition rate of approximately 84%. Online programs tend to have fairly high attrition rates, with web-based programs reporting attrition of between 43 to 50 percent (Anderson-Bill et al., 2011). These findings help elucidate general behavior in relation to web-based activities, however these findings are directed towards work based, primary care, and other community-based interventions and do not include PA-based programming, as there is little evidence explaining what attrition rates are seen in web-based PA programming (Anderson-Bill et al., 2011).

Health information, including exercise, is searched by 83% of internet users; demonstrating the internet's importance of providing PA-based programs available to the public (Anderson-Bill et al., 2011). Research has demonstrated that web-based interventions

have increased financial, time, and geographical benefits for public use than their face-to-face counterparts (Alley et al., 2018; Krämer et al., 2021). Therefore, it is important to understand the reasoning behind attrition rates for PA-based online programs in order to revise these programs to create more long-term participants. Understanding the facilitators, barriers, and reflection of the program design between these groups, will lead to better understanding the feasibility of the program design. With this information, the program design can be revised in such ways to increase effectiveness in increasing self-determined motivation in participants and to decrease future attrition rates.

## Facilitators

### *Charity Event Training Protocol*

Feedback from participants in both groups stated the 12-week training program was clear, straightforward, and easy to follow. Additionally, over half the completed participants utilized more than 50% of the additional training resources that were provided. This exemplifies the usefulness of the additional training resources for the participants.

Previous research has demonstrated an increase in competence, or accomplishment, surrounding PA engagement will increase self-efficacy and furthermore increase motivation to continue engaging in PA (Fasczewski, Rothberger, et al., 2020). This research found that individuals with MS experience specific feelings, such as "accomplished" and "strong," that correspond with high levels of self-efficacy and increase their adherence to PA (Fasczewski, Rothberger, et al., 2020)

The $30 donated to the NMSS on completion of the virtual 5K event could strengthen the personal connection to the cause and increase intrinsic motivation to engage in the PA training protocol. Previous research demonstrates that fundraising for MS via a PA-based

charity event increases a sense of autonomy, and thus self-determined motivation, in those with MS due to the perceived control through contributions for research (Fasczewski, Cook, et al., 2020). Further research demonstrated donating to a charity via participation in a PA-based fundraising charity event increases the perception of directly having an impact on a loved one with MS, research for finding a cure, raising awareness about MS, and strengthening the MS community; thus increasing motivation to participate in these events (Fasczewski et al., 2021).

### *MS Educational Training Intervention*

Groups that participated in the educational intervention stated the Google Site was accessible and easy to use and the educational modules about MS were broken down into easy concepts to understand. Research has demonstrated that informational interventions increase feelings of self-efficacy (Powell et al., 2020). Based on the positive feedback received from both about the educational intervention, researchers can conclude this program included appropriate information about MS and therefore assisted participants in developing feelings of self-efficacy.

## Barriers

### *Charity Event Training Protocol*

The two largest barriers noted in both completion and dropout groups were the timing of the holidays in the middle of the participants' training and the winter weather. The dropout group noted competing demands, such as work, family, friends, and commuting being barriers for their completion of the program. Literature shows that without internalized motivation to engage in PA, competing demands take priority over a PA routine (Teixeira et al., 2012). Interestingly, both groups experienced the same barriers but only one group, the

completion group, overcame these barriers. One explanation for this is the dropout groups inability to continue the PA training in the face of these barriers is a lack of self-efficacy. Individuals must have self-efficacy and competence to increase their engagement in an activity (Bandura, 2004). Constructing self-efficacy is an important aspect to change behavior surrounding PA engagement (Rothberger, 2018). Previous research achieved integrating self-efficacy in the foundations of a PA intervention through social support and accountability, goal setting, stress management, and positive facilitator interactions (Powell et al., 2020).

Furthermore, those in the dropout group noted they would have benefitted from a one-on-one introduction session to help jumpstart their 12-week training. For some participants, this is may be the first time they are being physically active or the first time in many years. These participants faced the challenge of integrating a PA routine into their everyday life. One participant noted a gradual introduction into the program would have greatly benefited their adherence to the program by better integrating a PA routine into their everyday life and also by decreasing risk of injury. For these participants, they were easily discouraged by competing demands for their time, such as family and work obligations, and physical injury, such as shin splints.

Participants in both groups also noted that the incorporation of a social aspect to the training, whether in-person or virtual, would have benefited their training motivation. Research demonstrates that social support can increase self-efficacy and lead to long-term behavioral changes regarding PA engagement (Powell et al., 2020; Rothberger, 2018). A social component would have tied to the SDT concept of relatedness and BE concept of social norms, as shown in previous research (Fasczewski et al., 2021). Research has shown

that the perception of being part of a team fulfills the SDT psychological need of relatedness (Fasczewski, Cook, et al., 2020). Additionally, participants stated that distance tracking devices, such as a Fitbit or Garmin, would have helped motivate them throughout their training. Wearable PA trackers can add a level of enjoyment, challenge, and positive health motivation to PA engagement (Kerner & Goodyear, 2017) The addition of a Fitbit could potentially fulfill SDT psychology needs of competence by "providing feedback on physical activity performance through badges, alerts, and prompts," autonomy by the personalization of PA goals, and relatedness by through the "social features on the app." (Kerner & Goodyear, 2017).

### *MS Educational Training Intervention*

A lack of personalization of training and educational modules was noted by both the completed and dropout groups. Those with MS indicated that although the MS modules were easy to understand and very informative, the modules seemed more directed towards those who were not familiar with MS or those who were newly diagnosed with MS. These participants did not see the benefits of watching the MS modules and found them mundane. Therefore, the education needs to be more tailored towards the participant. This can be achieved by adding different modules and comprehensive quizzes to be more oriented towards those with a more long-term connection to MS. Previous research demonstrates educational interventions increase self-efficacy to engage in PA (Powell et al., 2020). These findings tie back to the need of personalization of the educational intervention for those with MS, to account for the various levels of knowledge and experience with MS that participants with a connection have prior to engaging in the program.

## Reflection of Program Design

Future implementation of the program should be revised to aid the successful completion of participants. The primary adaptation of the program design would be timing of the program implementation, since this led to the two largest barriers: timing of the holidays and winter weather. Additionally, these revisions should be focused on increasing self-efficacy, the key concepts of BE, and the three psychological needs of SDT; autonomy, competence, and relatedness. To do this, each aspect of the program design that did not work will be examined.

### *Additional Training Resources*

First, an update or lengthening of the additional training resources, as three out of the eight (37.5%) of the additional training resources were not utilized. Researchers need to incorporate more useful resources for participants to use, and possibly expand on the resources that were used. Such as, a section on how to integrate a PA routine into an individual's everyday lifestyle. This could be useful for participants who struggled with competing demands inhibiting their success in integrating a PA routine into their everyday schedule. Research demonstrates that educational information provided to participants could help increase self-efficacy, or competence, and overcome barriers to exercise (Powell et al., 2020). Despite this research, the completed groups entrance and exit SEE scores dropped. While the drop was not statistically significant, it was an unexpected find. This lack of self-efficacy increase post the educational intervention could be attributed to all five of the completed participants having a long-term connection to MS. This directly ties to a second point of improvement, which is to increase the personalization of the intervention.

### *Personalization of Program Design*

One way to increase personalization the educational training intervention was to split the MS modules into two levels. The first level of education is for those who do not have a connection to MS or are newly diagnosed with MS. The second level of the educational modules could be geared towards those who have a solid background and understanding of MS. This way, the program feels more personalized towards individuals with MS and would ultimately be more engaging and effective. Furthermore, participants who are practically inactive before starting this program, a gradual introduction to the program might be more beneficial.

A second way to increase personalization of the training protocol would be to combine a gradual introduction with the program and goal setting into a one-on-one session with the program facilitator. Research has demonstrated that goal setting is an important key to successful adherence to PA routines (Bandura, 2004; Powell et al., 2020; Rothberger, 2018). This gradual introduction and goal setting session would hopefully decrease the risk of physical injury, the attrition rate, and overall increase the feelings of competence.

Lastly, Motivational Interviewing (MI) could be integrated into the program design to increase personalization of the program. MI ties itself with SDT by increasing participant feelings of autonomy and intrinsic motivation (Mears & Kilpatrick, 2008). Research has shown that the integration of MI and SDT in a program increases the fulfillment of the three psychological needs of SDT and self-efficacy (Mears & Kilpatrick, 2008; Vansteenkiste & Sheldon, 2006). MI directly ties itself to the facilitator's role in a program design through four key elements: empathetic counseling, rolling with resistance, supporting self-efficacy, and developing discrepancies. Research has demonstrated that these four key elements

provided from the program facilitator can increase likelihood of participant adherence to the PA program (Mears & Kilpatrick, 2008). MI facilitates these four components by giving participants opportunities to share pre-participation in a program, what strategies work for them, what barriers they think they will face, and how they can overcome those barriers. The addition of MI can be tied to potentially decreasing one of the studies limitations, which was internal threat validity due to a nonequivalent control group. It is difficult to run a program design with broad age ranges, as motivation might differ across ages, and personalization of the program could decrease this limitation. Although this current study did not specifically or intentionally include concepts of MI into the program facilitators interactions with the participants, it is noteworthy to consider for future directions of this program design.

### *Additional Observations for Improvement*

To aid in increasing competence, the addition of a physical trophy or medal could be beneficial in addition to or in replacement of the completion certificate. Through the theory of SDT, an individual's drive to complete an event to obtain a reward, such as a medal, indicates their motivation to engage in that event is rooted in external regulation, which is the second to last lowest form of self-determined motivation (Ryan & Deci, 2020; Vallerand et al., 1992; Vora & Naik, 2016). The idea behind this is to integrate as many factors of the SDT spectrum as possible, there will be an increased chance of success in increasing a participants self-determined motivation to engage in the program. However, low self-determined motivation aspects, such as external regulation, should be minimized in the program design in order to prevent undermining participant's motivation; this idea ties to a sub theory in SDT, called Cognitive Evaluation Theory (SET), or CET. This theory focuses on what facilitates and diminishes development of intrinsic motivation in relation to

participation in specific activities (Bandura, 2004; Ryan et al., 2009). CET states that an activity that is controlling of an individual's behavior takes away the foundations of autonomy and competence, thus undermining intrinsic motivation to engage in that activity (Ryan et al., 2009). Furthermore, an activity that is autonomous of an individual's behavior, fosters the development of autonomy and competence, thus promoting intrinsic motivation to engage in that activity (Ryan et al., 2009). One goal of this intervention is to increase self-determined motivation to engage in PA with the implementation of the educational intervention. Therefore, this program does not want to rely on external rewards, such as medals, because research shows that it could undermine developing intrinsic motivation. Additional research evidence points out individuals would experience a decrease in intrinsic motivation to learn if their learning experience was tied to an external reinforcement rather than the simple satisfaction of learning (Bandura, 2004). In summary, as many aspects of SDT should be integrated into the program design to increase self-determined motivation; however, the program design should not rely solely on extrinsic motivation factors, especially controlled forms, as they will undermine intrinsic motivation to engage in PA.

In addition to the revisions the program facilitator made throughout the program and the proposed revisions for the future of the program, there were also aspects of the program that were not utilized. The Zoom check-ins had a zero percent attendance rate. Therefore, future revisions of the program design should terminate this aspect of the program. Researchers should implement another form of social interaction to increase relatedness within the program, such as a Facebook group page where participants can interact with each other (Wang et al., 2015).

The program's 5K training flexibility is a concept that needs to be promoted before participants start the program as opposed to only when participants reach out to the program facilitator about schedule alterations. This way participants will all have equal opportunity to this information, instead of just those participants who reach out to the program facilitator.

In the general exit questionnaire responses, the question that asked if the "virtual 5K changed perception of physical activity" was a yes or no question. In retrospect, this question should have followed up with asking why the participants answered yes or no. This would give researchers a better idea of whether the participants had a negative or positive perception change of physical activity due to their completion of the virtual 5K.

**Facilitator Notes**

Throughout the duration of the program, the program facilitator took notes on observations of both training and educational intervention that was effective and not effective. Certain aspects of protocol were added to the program as a reflection of the issues that were arising for the participants. For example, allowing participants to repeat days or a week of training if they got off track. Throughout the implementation of the program, participants would email the program facilitator with a reason they missed either days or a week of training. A few examples of excuses for missed training were due to timing of the holidays, weather, and COVID-19 issues. Instead of these missed days in training leading to the participant dropping the program, the program facilitator would encourage flexibility in the program design to allow for program adherence. This flexibility could have tied to an increase in autonomy, competence, and self-efficacy in participants, although there is no current research to support this claim. Due to the program having high attrition rates throughout its implementation, this addition to the protocol was needed in order to have

individuals complete the program. However, the flexibility of the design to allow for schedule alternations should have been promoted in the beginning of the program implementation. Due to this being promoted on an individual basis when participants reached out to the program facilitator, there is a probability of a program equitability across participants.

When the first participant completed the virtual 5K event, the program facilitator added a completion certificate to send to the participants. The completion certificate served as an indication of overcoming barriers and completing the virtual 5K, which ties itself to fulfilling the individual's sense of accomplishment, or competence (Bernhart et al., 2020). See Appendix R for Completion Certificate. To address the issue of attrition, the program facilitator also adjusted the wording of the weekly reminder email and added a check-in email. The wording of the weekly reminder email was tweaked to inform the participants which educational module and week of training they completed in the previous week. Occasionally, the weeks of the educational modules, or weekly comprehensive surveys for the control group, and training schedule would not align and this discrepancy would usually encourage participants to get back on track. The program facilitator added check-in emails a few weeks after the start of the program. If a participant was found to have stopped the educational modules, or the weekly comprehensive survey for the control group, a check-in email would be sent to them. The discrepancies of their educational modules or weekly comprehensive surveys would be noted and they were asked if they were still training in the program. Participants would either catch up on their educational modules or a majority of these participants would email back their reasons for dropping the program. Without the check-in emails, these participants might have never let the program facilitator know their

reasons for dropping out of the program, and there would have been a large amount of useful information missing to tie back to the feasibility of the program design. This wording charge in the weekly reminder emails aided in prompting a level of self-awareness in the participant regarding the training and educational program. Research demonstrates that promoting or increasing this level of self-awareness is useful in PA intervention adherence (Fry & Neff, 2009).

**Limitations**

As with all research, this project had limitations. The attrition was the largest limitation in this study, with an attrition rate of approximately 84%. Researchers attempted to minimize this issue by sending weekly emails to all participants and keeping the weekly modules and quizzes short for the experimental groups.

It was predicted that participants with a connection to MS were more likely to be older than those without a connection to MS, since those without a connection to MS were being recruited at ASU. A non-equivalent control group is a threat to internal validity: someone who is 40 years old with MS will have different motivational standards to participate in PA than someone who is 20 years old without MS. To minimize this issue, stratified sampling techniques during recruitment were used to standardize the age of the participants between the groups. Lastly, social-desirability bias could have been a potential limitation to the study.

The program facilitator conducting the interviews could also be noted as a limitation due to potential for bias. Participants might have been more inclined to share positive experiences and withhold negative perspectives about the intervention with researchers. Researchers attempted to minimize this limitation by using online forms such as Qualtrics

and google forms to collect most of the participants' data on the intervention. Social desirability bias is most likely highest with the post-intervention phone interviews.

This lack of program flexibility promotion in the beginning of program implementation could have led to inequitable access to information among participants.

**Conclusion**

The original hypothesis of the study was to examine whether a personal connection to MS correlated with higher self-determined motivation levels to participate in a 12-week training program, and if instituting an educational intervention about MS could create a personal connection to MS, thus leading to higher self-determined motivation. Original research planned to examine motivational differences between the connection to the cause, no connection to the cause, and the control group to assess the effectiveness of creating a personal connection to MS via the educational intervention. High attrition rates shifted the focus on the result analysis in examining the motivational differences between the completion group and the dropout group.

It is important to examine the underlying causes of attrition rates to properly assess the feasibility of the program design to increase self-determined motivation. With this assessment, the program can be revised to best decrease attrition rates and increase overall long-term adherence to PA engagement by fulfilling key concepts of BE and SDT.

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## APPENDIX A

### Screening Questions

Hello!

Thanks so much for reaching out about the study, I can absolutely tell you more about it. We are providing a free virtual training program for a 5K. We offer three different types of training programs: walk, run, or a mix of walk and run. The training for the 5K is 12 weeks long and is designed to be progessive and easy to follow, and the virtual 5K at the end of your training can be whenever and wherever you'd like it to be. We can help figure out which one fits you and your goals. We are also providing additional training resources and support that are offered online, so they are super accessible. At the end of your virtual 5K, we will be donating money to the National Multiple Sclerosis Society.

If you want, we can set up a phone call sometime this week or next. This will give us an opportunity to talk more about the study and for you to ask any questions you might have; it'll also give you some more insight on if this is a good fit for you. Let me know and I look forward to hearing from you!

Best,
Paige Bramblett

### Phone Call Script

Hey, thank you so much for expressing interest in this study and willing to set up this phone call with me. Do you have any questions for me right now or would you prefer I give you the run down first?

Our study is focusing on motivation and participation in training for a 5K event that benefits the National Multiple Sclerosis Society, called PACES RACES for MS 5K. The 5K is a free virtual event and the training for it is 12-weeks. We will provide three 12-week training protocols (walk, run, or intermediate) and you get to choose which one you want to do. Also, you can start the training for the virtual event whenever you want, and your virtual event can be on whatever day works best for you. Now for how it benefits the National MS Society: once you get closer to finishing the 12 week training protocol, you will register for your virtual 5K event. We will give you the money for the entrance fee, you'll register for the event, and that money will be directly donated to the National MS Society.

This interview will consist of a few short screening questions to understand your current physical activity level and background to see if you qualify for the criteria of the study. At any point during this process you can opt out of continuing. Would you like to participate in the study and continue with the screening questions?

**Eligibility Screening Questionnaire - cut off: 150 minutes of moderate intensity exercise a week (ie. 30 mins a day for 5 days)**

1. Did you participated in planned exercise the past year?
    a. Can you tell us more about that?
2. Are you currently physically active?

    a. What type of physical activity do you participate in and how much do you do?
3. Have you been physically active in the past year?
    a. Can you please tell me more about that?
4. What is your physical activity background?
5. Do you have a running background?
    a. Event cut off: at least a year
6. Have you ever completed a run event, whether competitive or for fundraising?

Okay great, thank you so much for answering those questions.This next set of 7 questions is called the "physical activity readiness questionnaire," it is yes/no answers. This is just to make sure you are healthy enough to participate in the study. Are you ready?

**Administer PAR-Q**

**PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)**

| | Questions | Yes | No |
|---|---|---|---|
| 1 | Has your doctor ever said that you have a heart condition and that you should only perform physical activity recommended by a doctor? | | |
| 2 | Do you feel pain in your chest when you perform physical activity? | | |
| 3 | In the past month, have you had chest pain when you were not performing any physical activity? | | |
| 4 | Do you lose your balance because of dizziness or do you ever lose consciousness? | | |
| 5 | Do you have a bone or joint problem that could be made worse by a change in your physical activity? | | |
| 6 | Is your doctor currently prescribing any medication for your blood pressure or for a heart condition? | | |
| 7 | Do you know of any other reason why you should not engage in physical activity? | | |

*If you have answered "Yes" to one or more of the above questions, consult your physician before engaging in physical activity. Tell your physician which questions you answered "Yes" to. After a medical evaluation, seek advice from your physician on what type of activity is suitable for your current condition.*

Okay great, thank you so much for answering those questions. I'm going to ask a couple more questions and then give you some more information about the study.

**Involvement in the Study Questions:**

1. Do you have a personal connection to MS?
2. What is your personal connection to MS?
3. All participants will be asked to report weekly progress. This is just two quick questions. Additionally, depending on which group you are placed in, there may be a requirement for an educational component. This entails watching a short (5-10 min) video about MS and taking a short quiz. This is not time consuming and will only

take 15-20 minutes total each week. Would it be okay if you were in this group or would you prefer not to be?

4. You will also be provided access to additional training recourses to help answer any questions you might have about training. For example, stretching, hydration, dynamic warm-up, nutrition, and more.
5. Additionally, you will be provided with weekly zoom check-in's are on Wednesdays at 7PM EST. These zoom check-ins are not mandatory, but it is available if you have any questions about your training. If you have any questions outside of training, please email me so we can set up a different time.
6. Once you are ready to complete the 5K virtual event, you will be reimbursed $30 to benefit the National Multiple Sclerosis Society to pay your entrance fee.
7. Depending on which group you are in, there is a potential you may need to fundraise $30 for the National Multiple Sclerosis Society. Is this okay with you?
8. Let's figure out which training protocol you want to do (walk, run, or intermediate).

**provide all three protocols & have them pick one**

**Post Screening:**

Do you have any questions? Okay the next step is I will send you an email of information to get started. In that email there will be a qualtrics link containing an "enrollment form" which is a consent form and a basic demographics questionnaire. Once you complete this, you will receive a follow up email with all the information we went over today so you have it in one place, and it will contain all the information you need to complete the training and virtual 5K event.

## Appendix B

## Enrollment Form

Hello,

You recently participated in a screening process to participate in a virtual 5K event benefiting the National Multiple Sclerosis Society, called PACES RACES for MS 5K. Below is the link to the “enrollment form” of this study. This contains a consent form and basic demographics, and should only take 5-10 minutes.

Once you have completed this, you will get another email that explains everything about your participation in this study. We appreciate your time. Please do not hesitate to reach out if you have any questions.

https://appstate.az1.qualtrics.com/jfe/form/SV_38XLqhMCguKEVpQ

Thank you,
Paige
229.221.4567
hbpa@appstate.edu

## Appendix C

### Godin Leisure Time Exercise Questionnaire (Godin)

In this section, we would like to ask you about your current physical activity and exercise habits that you perform regularly, at least once a week. Please answer as accurately as possible.

1.) **During a typical 7-Day period (a week), how many times on the average do you do the following kinds of exercise for more than 15 minutes during your free time (write in each box the appropriate number).**

| | Times/week | Minutes/session |
|---|---|---|
| STRENUOUS EXERCISE (HEART BEATS RAPIDLY):<br>e.g.- running, jogging, elliptical, hockey, football, soccer, racquetball, basketball, cross country skiing, martial arts, roller skating, vigorous swimming, vigorous long distance bicycling | ____ | ____ |
| MODERATE EXERCISE (NOT EXHAUSTING):<br>e.g.- fast walking, baseball/softball, badminton, tennis, volleyball, easy swimming, easy bicycling, dancing | ____ | ____ |
| MILD EXERCISE(MINIMAL EFFORT):<br>e.g.-yoga, archery, fishing, bowling, golf, easy walking | ____ | ____ |

## APPENDIX D

### Patient Determined Disease Step (PDDS)

Please read the choices listed below and choose the one that best describes your own situation. This scale focuses mainly on how well you walk. Not everyone will find a description that reflects their condition exactly, but please mark the one category that describes your situation the closest.

☐ **0 Normal:** I may have some mild symptoms, mostly sensory due to MS but they do not limit my activity. If I do have an attack, I return to normal when the attack has passed.

☐ **1 Mild Disability:** I have some noticeable symptoms from my MS but they are minor and have only a small effect on my lifestyle.

☐ **2 Moderate Disability:** I don't have any limitations in my walking ability. However, I do have significant problems due to MS that limit daily activities in other ways.

☐ **3 Gait Disability:** MS does interfere with my activities, especially my walking. I can work a full day, but athletic or physically demanding activities are more difficult than they used to be. I usually don't need a cane or other assistance to walk, but I might need some assistance during an attack.

☐ **4 Early Cane:** I use a cane or a single crutch or some other form of support (such as touching a wall or leaning on someone's arm) for walking all the time or part of the time, especially when walking outside. I think I can walk 25 feet in 20 seconds without a cane or crutch. I always need some assistance (cane or crutch) if I want to walk as far as 3 blocks.

☐ **5 Late Cane:** To be able to walk 25 feet, I have to have a cane, crutch or someone to hold onto. I can get around the house or other buildings by holding onto furniture or touching the walls for support. I may use a scooter or wheelchair if I want to go greater distances.

☐ **6 Bilateral Support:** To be able to walk as far as 25 feet I must have 2 canes or crutches or a walker. I may use a scooter or wheelchair for longer distances.

☐ **7 Wheelchair / Scooter:** My main form of mobility is a wheelchair. I may be able to stand and/or take one or two steps, but I can't walk 25 feet, even with crutches or a walker.

☐ **8 Bedridden:** Unable to sit in a wheelchair for more than one hour.

## APPENDIX E

### Multiple Sclerosis Knowledge Survey

1. What is MS?
    a. Is an autoimmune disorder where the body attacks its nerve fibers
    b. Is a chronic illness
    c. Causes a disruption of the signal to and from the brain
    **d. All of the above**
2. Is there one type of MS?
    a. Yes/**No**
3. What does the body's immune system attack when someone has MS?
    a. Bones
    b. Muscles
    **c. Myelin**
    d. Tendons
4. Which biological sex does MS impact more?
    a. Males
    **b. Females**
5. How can someone manage MS?
    a. Medication
    b. Physical Activity
    c. Nutrition
    **d. All of the above**
6. Which options are “invisible symptoms” of MS
    a. Cognitive changes (memory, concentration, decision making)
    b. Bladder and bowel changes
    c. Numbness and tingling
    **d. All of the above**
7. Is depression in the MS population higher than a non-MS population?
    a. **Yes**/No
8. How many people have MS in the USA currently?
    **a. 1 million**
    b. 2.3 million
    c. Approximately 300,000
    d. 30 million
9. Statistically, which symptom of MS is the most common?
    a. Double vision
    **b. Fatigue**

c. Weakness
d. Numbness

10. 5 years post MS diagnosis, what percentage of people become unemployed?
    a. 20%
    b. 50%
    **c. 70%**
    d. 99%
11. Is a person required to disclose their MS diagnosis to their employer?
    a. Yes/**No**
12. Is having an adequate Vitamin D level important for those with MS?
    a. **Yes**/No
13. Does exercise help manage fatigue in those with MS?
    a. **Yes**/No
14. Can exercise improve balance, mobility, and mood in those with MS?
    a. **Yes**/No

# APPENDIX F

## EXERCISE REGULATIONS QUESTIONNAIRE (BREQ-3)

**Age: _____ years** **Sex: male female (please circle)**

***WHY DO YOU ENGAGE IN EXERCISE?***

We are interested in the reasons underlying peoples' decisions to engage or not engage in physical exercise. Using the scale below, please indicate to what extent each of the following items is true for you. Please note that there are no right or wrong answers and no trick questions. We simply want to know how you personally feel about exercise. Your responses will be held in confidence and only used for our research purposes.

| | | Not true for me | | Sometimes true for me | | Very true for me |
|---|---|---|---|---|---|---|
| 1 | It's important to me to exercise regularly | 0 | 1 | 2 | 3 | 4 |
| 2 | I don't see why I should have to exercise | 0 | 1 | 2 | 3 | 4 |
| 3 | I exercise because it's fun | 0 | 1 | 2 | 3 | 4 |
| 4 | I feel guilty when I don't exercise | 0 | 1 | 2 | 3 | 4 |
| 5 | I exercise because it is consistent with my life goals | 0 | 1 | 2 | 3 | 4 |
| 6 | I exercise because other people say I should | 0 | 1 | 2 | 3 | 4 |
| 7 | I value the benefits of exercise | 0 | 1 | 2 | 3 | 4 |
| 8 | I can't see why I should bother exercising | 0 | 1 | 2 | 3 | 4 |
| 9 | I enjoy my exercise sessions | 0 | 1 | 2 | 3 | 4 |
| 10 | I feel ashamed when I miss an exercise session | 0 | 1 | 2 | 3 | 4 |
| 11 | I consider exercise part of my identity | 0 | 1 | 2 | 3 | 4 |
| 12 | I take part in exercise because my friends/family/partner say I should | 0 | 1 | 2 | 3 | 4 |
| 13 | I think it is important to make the effort to exercise regularly | 0 | 1 | 2 | 3 | 4 |
| 14 | I don't see the point in exercising | 0 | 1 | 2 | 3 | 4 |
| 15 | I find exercise a pleasurable activity | 0 | 1 | 2 | 3 | 4 |
| 16 | I feel like a failure when I haven't exercised in a while | 0 | 1 | 2 | 3 | 4 |

| | | | | | | |
|---|---|---|---|---|---|---|
| 17 | I consider exercise a fundamental part of who I am | 0 | 1 | 2 | 3 | 4 |
| 18 | I exercise because others will not be pleased with me if I don't | 0 | 1 | 2 | 3 | 4 |
| 19 | I get restless if I don't exercise regularly | 0 | 1 | 2 | 3 | 4 |
| 20 | I think exercising is a waste of time | 0 | 1 | 2 | 3 | 4 |
| 21 | I get pleasure and satisfaction from participating in exercise | 0 | 1 | 2 | 3 | 4 |
| 22 | I would feel bad about myself if I was not making time to exercise | 0 | 1 | 2 | 3 | 4 |
| 23 | I consider exercise consistent with my values | 0 | 1 | 2 | 3 | 4 |
| 24 | I feel under pressure from my friends/family to exercise | 0 | 1 | 2 | 3 | 4 |

**Thank you for taking part in our research**

## APPENDIX G

### Self-Efficacy for Exercise (SEE) Scale

How confident are you right now that you could exercise three times per week for 20 minutes if:

| | **Not Confident Very Confident** | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1. The weather was bothering you | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 2. You were bored by the program or activity | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 3. You felt pain when exercising | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 4. You had to exercise alone | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 5. You did not enjoy it | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 6. You were too busy with other activities | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 7. You felt tired | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 8. You felt stressed | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |
| 9. You felt depressed | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 |

## APPENDIX H

## Post-Intervention Questionnaire

Part A

1. Prior to being in this program, have you heard about the National MS Society?
    a. Yes/No
2. Prior to participating in this program, have you ever participated in a MS fundraising charity event?
    a. Yes/No
3. How did you hear about this specific program?
    a. Friend
    b. Family member
    c. Physical Flyer (where)
    d. Flyer on the internet (where)
    e. Email Announcement
    f. Other
4. Has the training and participation in the virtual 5K event changed your perception of physical activity?
    a. Yes/No
5. On a scale of 1-10, what is your overall satisfaction with your outcome from this training program?
6. On a scale of 1-10, how has this program positively impacted your physical activity participation?
7. Did you utilize the additional training information folder? (skip logic)
    a. Yes/No
8. How many times did you utilize the additional training resources?
    a. 1-2 times total
    b. Once a month (3-4 times total)
    c. Every few weeks (5-8 times total)

    d. Every week (9-12 times total)
    e. 2-3 times per week
    f. Almost daily
9. Check which additional training resources you looked at (choose all that apply)
10. Do you have plans for future physical activity engagement?
    a. Yes/No
11. Did you participate in the MS education program? (skip logic)
12. On a scale of 1-10, how much do you feel your knowledge increased as a result of participating in the MS education intervention?
13. On a scale of 1-10, how likely are you to continue to support the National Multiple Sclerosis Society moving forward?
14. On a scale of 1-10 (1 being not helpful at all, 10 being very helpful) how helpful did you find the additional training information helpful?
15. On a scale of 1-10 (not at all true, etc) , I believe completing these events positively impacts those with MS.
16. On a scale of 1-10, I plan to continue participating in MS fundraising events.

Part A open ended:

1. What barriers to physical activity did you face while participating in the program?
2. Overall, which part of this program was most helpful?
3. Which parts of this program do you feel could be improved?
4. What additional resources or information would have been helpful to you during this process?
5. What was the most challenging part of the 5K training and/or event for you?
6. How did you overcome the challenges you faced during your training?
7. What else would you like to share about your experience in this program?

8. Would you be willing to participate in an interview or a focus group to share more about your experience? (If you choose to participate you will be redirected to a different site to give your contact information.)
    a. yes/no. Have them put a name and email contact
        i. Put link to google form. Participation for follow up interview -> where they can put their name & preferred contact information

## APPENDIX I

### Post-Intervention Phone Interview

1. Why did you start the MS Virtual 5K program? (what were your goals?)
2. What goals did you set for yourself as a part of this program?
    a. How successful were you at meeting your goals?
3. What parts of the program were difficult for you? What problems or barriers did you experience?
4. How could this program better meet your needs?
5. What did you like about the program structure? What could be improved?
    a. Consider: - - -
6. Thinking about the educational intervention part of the program. What did you like about it? What could be improved?
7. How do you think this program has increased your motivation to continue PA?
8. General Questions/Comments

## APPENDIX J
## Initial Email Script

*Experimental Group*

Hello,

This email contains important information to get started with your 5K training and MS Educational Intervention. First, is the pre-intervention MS Knowledge Survey (link below). We want to know your baseline on MS knowledge before you continue on completing the MS educational modules.

Next, the "entrance questionnaire," which will consist of a few short surveys, and should take no more than 10-15 minutes. This questionnaire will include the Godin, BREQ-3, SEE, and PDDS if you have MS. The Godin questionnaire is a self-reported scale about your physical activity levels. The BREQ-3 is a questionnaire about motivation. The SEE is a self-report of your own exercise self-efficacy, or confidence. Finally, if you have Multiple Sclerosis, you will take the PDDS, which is a survey about the severity of your symptoms.

Next, the link to the Google Site is below. Here you will find all three 5K training protocols, additional training resources, the MS educational modules and quizzes, and the zoom link to weekly check-ins.

On the first page of the Google Site you will see yellow "buttons" for the three training protocols, additional training resources, and the weekly zoom check-in. All you have to do is click on those yellow buttons and it'll take you to what you're looking for. Reminder that the additional training resources are to help answer any questions you might have about training. For example, stretching, hydration, dynamic warm-up, nutrition, and more. The weekly zoom check-in's are on Wednesdays at 7PM EST. These zoom check-ins are not mandatory, but it is available if you have any questions about your training. If you have any questions outside of training, please email me so we can set up a different time.

The MS educational modules are on the second page of the website. To access each week's modules, click on the white "button" that says the week on it, ie "Week 1", and it'll take you to a document that has the link to the short MS video and a link to the quiz. Watch the video first and then take the quiz.

I will send you weekly emails as reminders to complete the modules, quizzes, and to stay on track of your 5K training protocol. Don't hesitate to reach out about any questions.

Once you're ready to complete the virtual 5K event, you will be reimbursed $30 to benefit the National Multiple Sclerosis Society to pay your entrance fee.

Lastly, in the screening process you've decided to pick the (one of the three protocols) protocol, let me know if this is not correct. All three training protocols can be accessed on the Google Site page. At any point during the training you can switch training protocols, just let us know so we are up to date! **Don't forget to complete Pre-Intervention MS Knowledge Survey and the Entrance Questionnaire before continuing onto the Google Site.** Once you complete these forms you are ready to start your training! You can

start the training on any day, but due to formatting of the program it might be easier to start on a Sunday or Monday.

If at any time during any of the online surveys or during your participation in the virtual 5k run or walk you no longer wish to participate you are welcome to stop without penalty. You have no obligation to continue. You are not required to let us know if you drop out, but it would be helpful with data collection and research purposes, so please let us know if you wish to no longer participate.

Pre-Intervention MS Knowledge Survey:
https://appstate.az1.qualtrics.com/jfe/form/SV_4YNy80zwT1MeRp4

Entrance Questionnaire: https://appstate.az1.qualtrics.com/jfe/form/SV_8IWIF9NkedlfLQa

Google Site Link: https://sites.google.com/appstate.edu/mscharityevent/home

Thank you,
Paige Bramblett

*Control Group*
Hello,

This email contains important information to get started with your 5K. Attached to this email is the "entrance questionnaire." This questionnaire will consist of a few short surveys, and should take no more than 10-15 minutes. This questionnaire will include the Godin, BREQ-3, SEE, and PDDS if you have MS. The Godin questionnaire is a self-reported scale about your physical activity levels. The BREQ-3 is a questionnaire about motivation. The SEE is a self-report of your own exercise self-efficacy, or confidence. Finally, if you have Multiple Sclerosis, please take the survey about the severity of your symptoms, called the PDDS.

Attached to this email are three pdf files of each 5K training protocol (walk, run, or intermediate). In the screening process you've decided to pick (one of the three protocols), let me know if this is not correct. This email also contains a link to the additional training resources. Reminder that the additional training resources are to help answer any questions you might have about training. For example, stretching, hydration, dynamic warm-up, nutrition, and more.

Lastly, the zoom link to the weekly check-ins on Wednesdays at 7PM EST. These zoom check-ins are not mandatory, but it is available if you have any questions about your training. If you have any questions outside of training, please email me so we can set up a different time. I will send you weekly emails to remind you to stay on top of your training protocol.

If at any time during any of the online surveys or during your participation in the virtual 5k run or walk you no longer wish to participate you are welcome to stop without penalty. You have no obligation to continue. You are not required to let us know if you drop out, but it would be helpful with data collection and research purposes, so please let us know if you wish to no longer participate.

Entrance Questionnaire: https://appstate.az1.qualtrics.com/jfe/form/SV_8lWIF9NkedlfLQa

**Pdf file of training protocols:**

Additional Training Resources:
https://docs.google.com/document/d/1kHhcChroKdKOh9aYcvp8L6MnQLgaA8H8pFOM0_QEGR8/edit
Zoom Link:
https://appstate.zoom.us/j/97151600182?pwd=Zkt1TlE5cW96a2dBd0tJRm9lWXVBdz09

Best,
Paige Bramblett

## Appendix K
## Phone Interview Consent Form

**Introduction**
You are being asked to participate in a post-event phone interview due to your completion of the 12-week virtual 5K training protocol and event, called PACES RACES FOR MS 5K, to benefit the National Multiple Sclerosis Society (NMSS). We are interested in learning about your experience in the program, the challenges you faced, the aspects of the program you found helpful, and the ways we can improve the program for the future.

**Study Activities**
This interview is being conducted for research purposes. You will be asked to answer open-ended questions about your participation in the 12-week virtual training program and the completion of the Virtual 5K event. Your voice/answers will be recorded and used for analysis at a later date. You do not have to answer any specific questions and may decline an answer for any reason.

**Duration**
The interview will last approximately 45 minutes to 1 hour.

**Risk and Benefits**
There is no direct benefit associated with participating in the interview.

**Confidentiality**
A breach of confidentiality is always a possible risk for any study. All of your information will be encrypted and stored on a password protected computer, and your study data will not include any direct identifiers. Your identity will be linked to study data through a "master list" that is kept separate from the data. No one will have access to your information except the Principle Investigator and Research Assistant. Appalachian State University staff may view identifiable data for the purpose of making sure that research is conducted in lines with government regulations and university policy. Data from this study may be used for future research or shared with other researchers after all identifiers have been removed from the dataset.

**Participation**
Participating in this phone interview is completely voluntary. Even if you decide to participate now, you may change your mind and stop at any time. You may choose to drop out of the study at any time without penalty.

**Questions or Concerns**

If you have questions about this research study, you may contact Paige Bramblett at bramblettpn@appstate.edu or at (229) 221-4567 (Graduate Student); or Kimberly Fasczewski (Principle Investigator) at fasczewskiks@appstate.edu or at (828) 262-7987. If you felt like you have been harmed in any way, emotionally or physically, by this study you may contact Kimberly Fasczewski (Principle Investigator) at fasczewskiks@appstate.edu or at (828) 262-7987.

If you have concerns about your rights as someone taking part in this research, please contact the Office of Research Protections at Appalachian State University at (828)262-2692 or at irb@appstate.edu

**Consent Agreement**

Please say your full name out loud, signifying you understand the consent agreement and you want to participate in the focus group

## Appendix L

## Multiple Sclerosis Educational Training Intervention

## WEEK 1

What is MS? - youtube video from NMSS
https://www.youtube.com/watch?v=geQP_zYS-6s
Knowledge is Power: Introduction to MS & Personal Stories
https://www.youtube.com/watch?v=K6485Eg2K7w&t=6s

Questions on Educational Module

1. MS . . .
    a. Is an autoimmune disorder where the body attacks its nerve fibers
    b. Is a chronic illness
    c. Causes a disruption of the signal to and from the brain
    **d. All of the above**
2. What are some symptoms of MS?
    a. Blindness
    b. Fatigue
    c. Mood changes
    **d. All of the above**
3. Is there one type of MS?
    a. Yes/**No**
4. What is progressive MS?
    a. A period of time with new attacks of MS symptoms and then periods of time when those symptoms go away partially or completely
    **b. A gradual and ongoing loss of function without distinct attacks**
5. Is there a cure for MS?
    a. Yes/**No**
6. What does the body's immune system attack when someone has MS?
    a. Bones
    b. Muscles
    **c. Myelin**
    d. Tendons

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?

3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 2**

Knowledge is Power - Symptoms Diagnoses, & Types of MS - https://www.youtube.com/watch?v=XSY2iK7njUA

Questions on Educational Module

1. Can MS impact any part of the nervous system?
    a. **Yes**/No
2. Statistically, which symptom of MS is the most common?
    a. Double vision
    **b. Fatigue**
    c. Weakness
    d. Numbness
3. Is there a single test to diagnose MS?
    a. Yes/**No**
4. What are some other ways to test for MS? (multiple answer option)
    **a. Spinal taps**
    **b. Evoked potentials**
    c. EKG
    **d. MRI of brain and spinal cord**
    e. Graded exercise test
5. Which biological sex does MS impact more?
    a. Males
    **b. Females**
6. What is the average age of diagnoses for MS?
    a. Under 10 years old
    **b. 30 years old**
    c. 65 years old
    d. Above 65 years old
7. Which of the following is the most common type of MS?
    **a. Relapsing-Remitting MS**
    b. Secondary-Progressive MS
    c. Primary-Progressive MS
    d. None of the above

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)

2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 3**

How I'm Living with MS (TEDx) - https://www.youtube.com/watch?v=BwfqBBeQSQ0

Questions on Educational Module

1. What were Robins first symptoms of MS? (multiple answer option)
    a. **Numbness**
    b. **Dizzy**
    c. Laziness
    d. **Blurry eyesight**
2. Is Robin currently functioning in her daily activities?
    a. **Yes**/No
3. How many people have MS in the USA currently?
    a. **1 million**
    b. 2.3 million
    c. Approximately 300,000
    d. 30 million
4. Is it easy to be diagnosed with MS?
    a. Yes/**No**
5. How many people with MS stop taking or alter their medication due to the high cost of medication?
    a. 10%
    b. 20%
    c. **40%**
    d. 80%
6. What is one of the number one causes to a MS flare up?
    a. Lack of Sleep
    b. Exercising
    c. **Stress**
    d. Laughing

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?

3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 4**

Invisible Symptoms Part 1- https://www.youtube.com/watch?v=vqUN77VdI-s

Questions on Educational Module

1. Can you tell someone has MS by looking at them?
    a. Yes/**No**
2. Which options are "invisible symptoms" of MS
    a. Cognitive changes (memory, concentration, decision making)
    b. Bladder and bowel changes
    c. Numbness and tingling
    **d. All of the above**
3. Are certain MS symptoms always identified as being related to MS?
    a. Yes/**No**
4. How can someone manage MS?
    a. Medication
    b. Physical Activity
    c. Nutrition
    **d. All of the above**
5. Does everyone with MS have the same symptoms?
    a. Yes/**No**

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 5**

Aging and MS - https://www.youtube.com/watch?v=kUUKV12BWeg&t=35s

Questions on Educational Module

1. Does Relapsing-Remitting MS usually turn into Secondary Progressive MS over a period of time?
    a. **Yes/**No
2. What is the number one worry about those who are older with MS?
    **a. Falls**
    b. Getting out of bed

c. Preparing meals
d. Walking

3. What cognitive tasks are difficult with MS patients, especially older MS patients? (multiple choice option)
    **a. Memory problems**
    b. Speaking
    **c. Ability to multitask**
    d. Listening
4. Is depression in the MS population higher than a non-MS population?
    a. **Yes**/No
5. Is it important for people without MS to recognize that they cannot see a lot of MS symptoms (fatigue, pain, depression, etc)
    a. **Yes**/No
6. What could be an inhibiting factor for employment for those with MS, especially as those individuals get older?
    **a. Ability to multitask**
    b. Answering the phone
    c. Typing on a keyboard
    d. Sitting at a desk

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 6**

Walk MS: Move Forward Your Way - https://www.youtube.com/watch?v=yw_jGrRelk4

Questions on Educational Module

1. What were some of the reasons people participated in the Walk MS event?
    a. Community
    b. Spread awareness of MS
    c. To support those with MS
    d. Raise funds for research
    **e. All of the above**
2. Who participates in Walk MS? (multiple answer option)
    a. People with MS

b. Those with family with MS
c. Those with friends with MS
**d. All of the above**

3. Does a Walk MS event give participants an opportunity to raise awareness?
    a. **Yes**/No
4. Did the people who participated Walk MS experience a sense of community?
    a. **Yes**/No
5. Are only people with MS allowed to participate in Walk MS?
    a. **Yes**/No
6. On a scale of 1-10 (1 being not at all, 10 being absolutely yes) do you think participating in a MS event positively impacts those living with MS?

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 7**

Mood & Cognitive in MS: [What You Can Do] - https://www.youtube.com/watch?v=9uKYOpN4pyA&list=PLnPWMdCPZiBZT-NHnpkdlsEQdemHIU8zo

- Please watch from 0:00 to 15:18

Questions on Educational Module

1. What are the four parts of cognitive processing? (multiple answer option)
    **a. Taking in information**
    **b. Storing information**
    c. Forgetting information
    **d. Processing information**
    e. Writing down information
    **f. Acting on information**
    g. Only B and D
    h. All of the above
2. What are some common cognitive issues in those with MS? (multiple answer option)
    **a. Processing speed**
    **b. Learning**
    c. Fatigue
    d. **Memory**

e. None of the above

3. When first diagnosed with MS, are those individuals experiencing all possible MS symptoms at once?
    a. Yes/**No**
4. What are known mood changes in those with MS?
    a. Depression
    b. Anxiety
    c. There are no mood changes in those with MS
    **d. Both depression and anxiety**
5. What percentage of those with MS experience disruptions in cognition and mood?
    a. Less than 10%
    b. 20%
    **c. Approximately 50%**
    d. 0%
6. 5 years post MS diagnosis, what percentage of people become unemployed?
    a. 20%
    b. 50%
    **c. 70%**
    d. 99%
7. 5 years post MS diagnosis, what are the two main reasons people become unemployed?
    a. Fatigue
    b. Double Vision
    c. Cognitive problems
    **d. Both fatigue and cognitive problems**
    e. All of the above
8. What does cognitive rehabilitation do?
    a. Make the lesions disappear that have impared learning and memory
    b. Helps the person decrease cognitive weaknesses
    **c. Helps the person use their cognitive strengths to compensate for their cognitive weaknesses**

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 8**

Chronically Ill, Very Healthy (Ted Talk)
https://www.youtube.com/watch?v=2lk_5-krMLE

Questions on Educational Modules

1. On a scale of 1-10 (1 being definitely not, 10 being definitely yes), can a person with MS live a fulfilling, positive, and healthy life?
2. On a scale of 1-10 (1 definitely not agree, 10 being definitely agree ) how do you feel about Pat's decision to not tell his family and friends about his MS diagnosis?
3. On a scale of 1-10 (1 being definitely not agree, 10 being definitely agree), do you agree with Pat's shift of perspective of his MS diagnosis when he said he would look at life as the "possibility of the things that I can do, rather than the things that are no longer available to me" ?
4. On a scale of 1-10 (1 being definitely not agree, 10 being definitely agree) do you agree with Pat's statement about life "giving compensations for the challenges that are put in front of you if you are open to looking for them" ?
5. On a scale of 1-10 (1 being definitely not, 10 being definitely yes), does Pat's experience with his MS diagnosis and his perspective of his life change your viewpoint on your own priorities in life?

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 9**

Knowledge is Power: Employment and Financial Security -
https://www.youtube.com/watch?v=aArcBqY5wjE

Questions on Educational Modules

1. Is a person required to disclose their MS diagnosis to their employer?
    a. Yes/**No**
2. What percentage of people diagnosed with MS experience changes with their thinking?
    a. 10%
    b. 25%

   c. **65%**
   d. 80%
3. Identify some primary reasons why people with MS leave the workforce? (multiple choice option)
   a. **Difficulty learning and remembering new information**
   b. **Cognition changes**
   c. Walking
   d. **Fatigue**
   e. **Attention & concentration**
   f. Speaking
   g. Using technology
   h. **Visual motor skills**
   i. Understanding their job
4. What is an important step in creating the best financial decision when diagnosed with MS?
   a. **Making a plan that's best for you**
   b. Quitting work immediately
   c. Listening to your friends advice
5. Can a person with MS still be productive at their job?
   a. **Yes**/No

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 10**

Knowledge is Power: Maintaining Healthy Relationships

- https://www.youtube.com/watch?v=UY-I0JDm6yk

Questions on Educational Modules

1. Is it important for friends and family members to learn about MS when their friend or family member is diagnosed with MS?
   a. **Yes**/No
2. Is communication important in a relationship (either with partners, family members, or friends) with someone with MS?
   a. **Yes**/No

3. What is important for family members to know when their family member is diagnosed with MS?
    a. **Understand that everyone has different coping strategies**
    b. Try to find a solution to every problem your family member with MS is going through
    c. Nothing
4. Is it important to have open communication about MS with children?
    a. **Yes**/No

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 11**

Diet and Nutrition in MS - https://www.youtube.com/watch?v=mRw34-rAdXk&t=4s

Questions on Educational Modules

1. In the video, did most of these people with MS cut out sugar in their diets?
    a. **Yes**/No
2. Is a balanced diet important for those with MS?
    a. **Yes**/No
3. At the time of the video (2016) was there evidence that gluten free or dairy free diets were better for those with MS?
    a. Yes/**No**
4. At the time of the video (2016) was there data that proved having MS and being overweight increased inflammation and MRI activity?
    a. **Yes**/No
5. Is having an adequate Vitamin D level important for those with MS?
    a. **Yes**/No
6. On a scale of 1-10 (1 being not very important, 10 being very important) do you think having a healthier diet is beneficial to those with MS?
    a. **Yes**/No

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

**WEEK 12**

Exercise / Physical Activity with MS - https://www.youtube.com/watch?v=SGzeG-zl4m0&t=1s

Questions on Educational Modules

1. Can you exercise if you have MS?
    a. **Yes**/No
2. Does exercise help manage fatigue in those with MS?
    a. **Yes**/No
3. On a scale of 1-10 (1 being not very important, 10 being very important) do you think it is important for those with MS to engage in exercise if possible?
4. Can exercise improve balance, mobility, and mood in those with MS?
    a. **Yes**/No
5. On a scale of 1-10 (1 being absolutely not, 10 being absolutely yes) do you think there is a correlation between engaging in exercise and having a positive social life?

Weekly Training Questions (These are questions pertaining to your training this week. Please provide as much information as you'd like:)

1. What did you learn about MS that you didn't know before? (open)
2. On a scale from 1-10 (1 being not very well, 10 being very well): How well did you stick to your training protocol this week?
3. On a scale from 1-10 (1 being not very well, 10 being very well): How well do you think your training program is going?

## APPENDIX M

### Google Site


**Resources**

Below are links to important resources for the 12-week MS virtual event training

| 5K Training Protocols | Additional Training Resources | Monday Zoom (7PM EST) |
|---|---|---|
| Walk | Resources | Zoom |
| Run | | |
| Intermediate | | |

## APPENDIX N

## Weekly Email Script

*Experimental Groups*
Hello,

I hope you are doing well! This is your weekly reminder to complete last week's module and quiz and to stay on top of your 5K training protocol. I have you down for completing **week #** of the modules and **week #** of the training schedule, this means you are moving into **week #** of training! If this is not correct, please reach out and let me know.

As a reminder, the modules and quizzes can be found on the Google Site, link below. Click on "modules" in the top right corner and then click on the week you are on. This will open a google document with the link to the youtube video and the link to the short quiz. Watch the video first and then take the quiz.

**The completion of the modules and quizzes are crucial to know where you are in the program and also for data collection. If you have dropped the program, please email me back and let me know.**

Make sure to check out the additional resources if you have any questions about your 5K training, link below. If you have any questions about training, please touch base with me Wednesday at 7PM EST, zoom link below. If you have any questions outside of the training, please email me at hbpa@appstate.edu so we can set up a different time.

Reach out if you have any questions at all.

Have a wonderful week!

Best,
Paige Bramblett

Google sites: https://sites.google.com/appstate.edu/mscharityevent/home

Additional Training Recourses:
https://docs.google.com/document/d/1kHhcChroKdKOh9aYcvp8L6MnQLgaA8H8pFOM0_QEGR8/edit

Zoom link:
https://appstate.zoom.us/j/97151600182?pwd=Zkt1TlE5cW96a2dBd0tJRm9lWXVBdz09

*Control Group*
Hello,

I hope you are doing well! Congratulations on finishing this past weeks training! I have you down for starting **week #.** Just a reminder to complete the weekly survey: **This survey is crucial to know where you are in the program, otherwise it will**

**seem you aren't participating at all:**
https://appstate.az1.qualtrics.com/jfe/form/SV_5dTvGjQYDcXUqTs

**If you have dropped the program, please email me back and let me know.**

I've attached pdf files of all three 5K protocols. Also, make sure to check out the additional resources if you have any questions about your 5K training, link below. If you have any questions about training, please touch base with me Wednesday at 7PM EST, zoom link below. If you have any questions outside of the training, please email me at hbpa@appstate.edu so we can set up a different time.

Best,
Paige Bramblett

PDF: three 5K training protocols
Additional Training Recourses:
https://docs.google.com/document/d/1kHhcChroKdKOh9aYcvp8L6MnQLgaA8H8pFOM0_QEGR8/edit
Zoom link:
https://appstate.zoom.us/j/97151600182?pwd=Zkt1TlE5cW96a2dBd0tJRm9lWXVBdz09

Happy training!
Paige

# Appendix O

## Charity Event Training Protocol

**12 Week WALK Plan**

| Week | Monday | Tuesday | Wednesday | Thursday | Friday | Saturday | Sunday |
|---|---|---|---|---|---|---|---|
| Week One | Walk 1 mile | REST/XT or STRETCH | Walk 1 mile | REST/XT or STRETCH | REST | Walk 1 mile | REST/XT or STRETCH |
| Week Two | Walk 1 mile | REST/XT or STRETCH | Walk 1 mile | REST/XT or STRETCH | REST | Walk 1.25 miles | REST/XT or STRETCH |
| Week Three | Walk 1.25 miles | REST/XT or STRETCH | Walk 1.25 miles | REST/XT or STRETCH | REST | Walk 1.5 miles | REST/XT or STRETCH |
| Week Four | Walk 1.5 miles | REST/XT or STRETCH | Walk 1.5 miles | REST/XT or STRETCH | REST | Walk 1.75 miles | REST/XT or STRETCH |
| Week Five | Walk 1.75 miles | REST/XT or STRETCH | Walk 1.75 miles | REST/XT or STRETCH | REST | Walk 2 miles | REST/XT or STRETCH |
| Week Six | Walk 2 miles | REST/XT or STRETCH | Walk 2 miles | REST/XT or STRETCH | REST | Walk 2.25 miles | REST/XT or STRETCH |
| Week Seven | Walk 2.25 miles | REST/XT or STRETCH | Walk 2.25 miles | REST/XT or STRETCH | REST | Walk 2.5 miles | REST/XT or STRETCH |
| Week Eight | Walk 2.5 miles | REST/XT or STRETCH | Walk 2.5 miles | REST/XT or STRETCH | REST | Walk 2.75 miles | REST/XT or STRETCH |
| Week Nine | Walk 2.75 miles | REST/XT or STRETCH | Walk 2.75 miles | REST/XT or STRETCH | REST | Walk 3 miles | REST/XT or STRETCH |
| Week Ten | Walk 3 miles | REST/XT or STRETCH | Walk 3 miles | REST/XT or STRETCH | REST | Walk 3.25 miles | REST/XT or STRETCH |
| Week Eleven | Walk 3.25 miles | REST/XT or STRETCH | Walk 3.25 miles | REST/XT or STRETCH | REST | Walk 3.5 miles | REST/XT or STRETCH |
| Week Twelve | Fun Walk | REST/XT or STRETCH | Fun Walk | REST | REST | RACE!! | REST |

1

## 12 Week INTERMEDIATE Plan

| Week | Mon | Tue | Wed | Thur | Fri | Sat | Sun |
|---|---|---|---|---|---|---|---|
| Week 1 | Run 1 Walk 2 x 4 | XT or Rest | Run 1 Walk 2 x 4 | Run 1 Walk 2 x 5 | Rest | Run 1 Walk 2 x 5 | 45 min. walk or XT |
| Week 2 | Run 1.5 Walk 2 x 4 | XT or Rest | Run 1.5 Walk 2 x 4 | Run 1.5 Walk 2 x 5 | Rest | Run 1.5 Walk 2 x 5 | 45 min. walk or XT |
| Week 3 | Run 2 Walk 2 x 4 | XT or Rest | Run 2 Walk 2 x 4 | Run 2 Walk 2 x 5 | Rest | Run 2 Walk 2 x 5 | 45 min. walk or XT |
| Week 4 | Run 2.5 Walk 2 x 4 | XT or Rest | Run 2.5 Walk 2 x 4 | Run 2.5 Walk 2 x 4 | Rest | Run 2.5 Walk 2 x 4 | 45 min. walk or XT |
| Week 5 | Run 3 Walk 2 x 4 | XT or Rest | Run 3 Walk 2 x 4 | Run 3 Walk 2 x 5 | Rest | Run 3 Walk 2 x 5 | 50 min. walk or XT |
| Week 6 | Run 3 Walk 1 x 5 | XT or Rest | Run 3 Walk 1 x 5 | Run 3 Walk 1 x 7 | Rest | Run 3 Walk 1 x 7 | 50 min. walk or XT |
| Week 7 | Run 3 Walk 1 x 6 | XT or Rest | Run 3 Walk 1 x 6 | Run 3 Walk 1 x 6 | Rest | Run 3 Walk 1 x 6 | 55 min. walk or XT |
| Week 8 | Run 3.5 Walk 1 x 5 | XT or Rest | Run 3.5 Walk 1 x 5 | Run 3.5 Walk 1 x 6 | Rest | Run 3.5 Walk 1 x 6 | 55 min. walk or XT |
| Week 9 | Run 3.5 Walk 1 x 6 | XT or Rest | Run 3.5 Walk 1 x 6 | Run 3.5 Walk 1 x 7 | Rest | Run 3.5 Walk 1 x 7 | 55 min. walk or XT |
| Week 10 | Run 4 Walk 1 x 6 | XT or Rest | Run 4 Walk 1 x 6 | Run 4 Walk 1 x 7 | Rest | Run 4 Walk 1 x 7 | 60 min. walk or XT |
| Week 11 | Run 4 Walk 1 x 7 | XT or Rest | Run 4 Walk 1 x 7 | Run 4 Walk 1 X 7 | Rest | Run 4 Walk 1 X 7 | 60 min. walk or XT |
| Week 12 | Run 4 Walk 1 x 6 | XT or Rest | Run 4 Walk 1 x 4 | 30 min. walk | Rest | 5K RACE! Run 4 Walk 1 | Rest |

## 12 Week RUN Plan

| Week | Mon | Tue | Wed | Thur | Fri | Sat | Sun |
|---|---|---|---|---|---|---|---|
| Week 1 | Run 1 mile | XT or Rest | Run 1 mile | XT or Rest | Rest | Run 1.5 miles | 45 min. walk or XT |
| Week 2 | Run 1 mile | XT or Rest | Run 1 mile | XT or Rest | Rest | Run 1.75 miles | 45 min. walk or XT |
| Week 3 | Run 1.5 miles | XT or Rest | Run 1.5 miles | XT or Rest | Rest | Run 2 miles | 45 min. walk or XT |
| Week 4 | Run 1.5 miles | XT or Rest | Run 1.5 miles | XT or Rest | Rest | Run 2 miles | 45 min. walk or XT |
| Week 5 | Run 1.5 miles | XT or Rest | Run 1.5 miles | XT or Rest | Rest | Run 2.25 miles | 50 min. walk or XT |
| Week 6 | Run 2 miles | XT or Rest | Run 2 miles | XT or Rest | Rest | Run 2.75 miles | 50 min. walk or XT |
| Week 7 | Run 2 miles | XT or Rest | Run 2 miles | XT or Rest | Rest | Run 3 miles | 55 min. walk or XT |
| Week 8 | Run 2 miles | XT or Rest | Run 2 miles | XT or Rest | Rest | Run 3 miles | 55 min. walk or XT |
| Week 9 | Run 2.5 miles | XT or Rest | Run 2.5 miles | XT or Rest | Rest | Run 3.25miles | 55 min. walk or XT |
| Week 10 | Run 3 miles | XT or Rest | Run 3 miles | XT or Rest | Rest | Run 3.25 miles | 60 min. walk or XT |
| Week 11 | Run 3 miles | XT or Rest | Run 3 miles | XT or Rest | Rest | Run 3.5 miles | 60 min. walk or XT |
| Week 12 | Run 3 miles | XT or Rest | Run 2 miles | XT or Rest | Rest | 5K RACE! | Rest |

## APPENDIX P

## ADDITIONAL TRAINING RESOURCES

Table of Contents



### Exercise Facts

***Did you know???***

***8 million Americans have adult-onset diabetes***
Physical activity in combination with a healthful diet can help reduce body fat, which will help prevent or control this type of diabetes.

***13.5 million Americans suffer from heart disease***
Physical activity strengthens your heart muscle, helps lower blood pressure, and improves blood cholesterol. All of these changes will improve blood flow throughout your body, increasing the heart's ability to function correctly.

***250,000 Americans suffer hip fractures each year***
Engaging in daily weight bearing exercise promotes bone formation and reduces the risk of Osteoporosis.

***Over 2/3 of adult Americans and 1 in 3 children are now considered overweight or obese (Body Mass Index >25).****
This is 133 million people in the adult population. Remember Newton's first law of motion: "A body in motion stays in motion and a body at rest stays at rest." We need to keep our bodies in motion and encourage those around us to be physically active.

***Between 1960 and 2002, the number of obese Americans (Body Mass Index >30.0) grew from 13% to 31% of the population?****

Proper nutrition and staying physically active will help control weight and prevent obesity.

***Depressive disorders affect approximately 18.8 million American adults (9.5% of the U.S. population) age 18 and older in a given year.***
Exercise has been found to reduce depression, anxiety and manage stress when done at regular intervals. Physical activity can elevate moods and create a more positive body image.

***According to the U.S. Surgeon General report, obesity is responsible for 300,000 deaths every year.***
This is why we do this. Our goal is not to win the race, take the podium or even have our picture on the front of the sports page. We do it to be healthier, less at risk of life threatening chronic diseases, more energetic, and to lead happier, more fulfilling lives.

***Nearly 1/3 of all calories in a typical American diet come from junk food.***
But that is not all that is at play. Americans also spend nine times as many minutes watching TV and movies as they do playing sports, participating in leisure activities, and getting exercise.

***21% of Americans continue to smoke and cancer is the leading cause of death to those under age 85, with close ties to cancer.***
The Surgeon General reports that cigarette smoking significantly harms almost every major organ of the body and has been directly linked to a new series of diseases including leukemia, cataracts, pneumonia and cancers of the kidney, cervix, pancreas and stomach. In addition, smokers are also 33% more likely to develop asthma.*

*Information obtain from US Corporate Wellness, Inc.
(http://xa.yimg.com/kq/groups/2219486/1307351043/name/2011ROI%20Corp%20Wellness%20Study.pdf)

Other information obtained from the Surgeon General: http://www.surgeongeneral.gov

**Staying Hydrated**

We all know that drinking fluid throughout the day is recommended, but how much do we need? The old rule of thumb was 8, 8 oz. glasses of water or 64 ounces a day. More recently the guidelines have changed to "drink when thirsty"- due to the thought that that our body will effectively signal us to meet our needs for fluid throughout the day. That being said, try to drink water with the goal of having your urine turn pale yellow to clear by mid-afternoon. This indicates a body that is fully hydrated and ridding itself of waste products.

You ask, "Why is a hydrated body so important?" Well to start off with, the human body is largely made of water - 65-70% water by weight. Fluid is responsible for keeping your body temperature regulated, blood volume correct, ridding your body of waste products, maintaining blood pressure and so much more! It is hard enough to get through the workday when you are

dehydrated (signs include: headaches, tiredness, nausea), but even more difficult to exercise in a dehydrated state. To insure your body is functioning at its best follow these simple guidelines:

1. Stay hydrated by drinking throughout the day, keeping urine a light yellow color (light lemonade color, not dark like apple juice).
2. Drink before you run with 14-20 ounces of water or sports drink 1-2 hours before training. Top off your tank with 8 ounces (1 cup) prior to exercise session.
3. Use the restroom just prior to your run to empty bladder.
4. Carry fluid with you. Bring along a bottle and drink 4 ounces every 15 minutes or 20ounces/hour.
5. Water is fine for workouts 60 minutes or less. For longer workouts, a sports drink is recommended. Ask your coach for guidance.
6. Weigh yourself before and after your workout. Avoid losing more than 2% body weight during exercise.
7. For Each pound lost during exercise sip 16-24 ounces of fluid/pound lost.
8. Drink 16-20 ounces of fluid while you cool down.
9. Be aware of climate changes. If it is hot, there is a change in humidity, or you are at a high altitude, your body will require more fluid than usual.
10. Know the signs of dehydration: Nausea after exercise, dark yellow urine, dry/sticky mouth, and dizziness.
11. If the training session lasts longer than 1 hour and/or is hot and humid consider taking a beverage with sodium or as a supplement to avoid dehydration.
12. If you gain weight during a training session you have become overhydrated (hyponatremia) and need to take in sodium, not more water.

## Dynamic Warm-Up

Warming up your muscles is an important part of your workout that needs to be done before every run. Without it, we increase the risk of injury and predispose ourselves to irreversible long-term damage. Dynamic stretching is useful before competition and has been shown to reduce muscle tightness. Unlike static stretching, dynamic stretches are not held, but use motion to do sport specific movements.

Begin each workout with the following dynamic stretches, in the order which they are listed:

1. **Toe Walks** - Walk on your tiptoes in either a circle or in a pacing pattern for approximately 1-2 minutes.
2. **Heel Walks** - Walk on your heels in either a circle or in a pacing pattern for approximately 1-2 minutes. Do another 30 seconds of toe walks again followed by heel walks.
3. **High Knees** - Do a walking march; lifting your knees high; keep your toes pointing straight ahead, not towards the ground. Do this for about 1-2 minutes.
4. **Squats** - Everyone's favorite! Do a standard squat but focus on putting your weight on your heels, not your toes. It should be like you're sitting back into a

seat. Keep your back as straight as possible, and hold arms out in front for balance. Do 10-20 of these.

5. **Lunges** - It's difficult to describe proper form in writing, so make sure you are watching your coaches during group warm-up to see what it should look like. Your knee should not extend past your toes. One lunge on each leg equals one complete lunge set. Do 10 at first, work up to 20.
6. **Jog in Place** - Jog in place while bringing your knees as high as possible. Do this for 20 seconds.
7. **Butt Kicks** - Jog in place except this time kick your legs back like you're trying to touch your heels to your butt. Do this for 20 seconds.

## Running Form

Proper running form should start from your head and finish at your toes. The goal of good form is to minimize the energy you expend and lessen the chance for injury. Although there is no one single "perfect" running gait, use the following as guidelines for proper running form:

**Head:** Keep your head slightly tilted down, looking at the ground in front of you, 10 to 15 feet ahead. Your facial muscles, jaw and neck should be relaxed. Enjoy your run!

**Shoulders:** Keep your shoulders relaxed and do not allow them to "slouch" forward. Hunching over will restrict the breathing passage, allowing less oxygen to get to your working muscles.

**Arms:** Arms should be bent at a 90-degree angle and relaxed. As you run, swing your arms forward, try not to swing them across your chest. Brush your hands past your waistband on the downswing, bringing them back behind your body. The arm movement should move in conjunction with your legs. Run with your legs, and let your arms go along for the ride!

**Hands:** Your thumbs and index finger should gently touch with your hand cupped, as though you are holding a potato chip that you don't want to break. Clenching your hands is taking excessive energy away from your legs and undue stress to your upper body. Again, don't let your hands cross over the middle of your chest- remember arms move forward for forward motion.

**Torso:** You want to keep your torso erect as if you are a puppet hanging on a string from above. This will allow your chest cavity to be open, which will allow easier breathing.

**Hips:** The hips should be facing forward, with no rotation. Your foot should strike with a heel to toe motion, directly under your hips.

**Feet:** Try to keep your feet low to the ground and touch the surface as light as possible. The lighter your feet touch the less pounding your body will incur (especially your joints.) Visualize yourself as if you are "running on eggshells"- this will help you stay light on your feet.

## MyPlate

Making sure that you are getting all your nutrients will help fuel your body to train for the 5K and also help prevent injury. All information here comes from MyPlate USA: https://www.myplate.gov/

**Fruits**: Not only are fruits delicious, they are packed with vital nutrients that your body needs, like Vitamin C, folate, potassium, and so much more. Daily fruit intake is different from each individual. Figure out what a cup of fruit looks like, and how much you should be eating daily here: https://www.myplate.gov/eat-healthy/fruits

**Vegetables**: Just like fruits, vegetables offer vital nutrients for your body like Vitamin A & C, potassium, folate, and don't forget fiber. Vitamin A keeps your eyes and skin healthy. Vitamin C helps your body absorb iron better and keeps your teeth and gums healthy. Diets rich in potassium help maintain a healthy blood pressure. Potassium can be found in sweet and white potatoes, tomato products, spinach, lentils, and so much more. Fiber can help lower blood cholesterol levels, and can be found in many vegetables. Learn more about how many veggies you should be eating daily and all the benefits that come from each one here:https://www.myplate.gov/eat-healthy/vegetables

**Grains:** What's a grain? Are oats grain? Is popcorn a grain?? A lot of foods fall into the "grain" category, and it might be a little confusing at first on how to decide which ones provide more nutrients than others. Grains are split up into two categories: whole grains and refined grains. It's important to understand the difference between whole and refined grains, so you can pick which is best to fuel your body while training for your 5K. To find out more details about these two grain categories, explore here: https://www.myplate.gov/eat-healthy/grains

**Protein Foods:** Foods with protein range from meat products, such as chicken, beef, fish, all the way to many vegetables, such as lentils, beans, peas, and soy products. Protein is necessary to help build muscle, and depending on the type of protein it can be packed with important nutrients (like B vitamins, iron, and magnesium).To learn more about the most beneficial proteins to have during training, check out this link: https://www.myplate.gov/eat-healthy/protein-foods

**Dairy:** Dairy products include milk, cheese, yogurt, and fortified soy milk and yogurt. Important nutrients that come from dairy products are calcium, phosphorus, Vitamin A, Vitamin D, and so much more. If you are dairy free, there are plenty of non-dairy substitutes that offer these nutrients like tofu, tahini, and fortified soy milk and yogurt. To learn more about healthy dairy options and alternatives, look here: https://www.myplate.gov/eat-healthy/dairy

## Helping you stay FIT

**Fuel**
The goal of fueling is to maintain steady blood-sugar levels throughout your workout. We recommend eating a combination of carbohydrates and protein about one to four hours before a run (morning runners can skip a pre-run snack if the run is less than 60 minutes). You will have to experiment during training to see what works best for you. Some people need a full four hours, while others only need one. To be safe, we recommend starting with at least 3 hours.

**Sunscreen**
Apply sunscreen 20 to 30 minutes before you run so it has time to bind with the skin.

**Foam Roller**
Use a foam roller before your pre and post run stretch. It helps loosen the tension or adhesions that limit a muscle's ability to elongate.

**Hit the Road**
Studies show that runners run best in the late afternoon, but if you train consistently during a specific time of day, you can train the cardiovascular system to deliver more oxygen to the working muscles at that time. The most important thing is to get moving – no matter what time of day!

**Refuel**
After hard or long runs eat a combination of carbohydrates and protein within 30 minutes to restock energy stores and rebuild muscle. Typically a 4:1 ratio is recommended.

**Stretch Out**
Before? After? When injured? All are good times to stretch, as long as you're using the right technique. Before a run, dynamic stretching helps elongate muscles so you run with optimal range of motion. Post-run, static stretching (holding for 20-30 seconds) helps release tightness. Static stretching post-run may benefit chronic, achy pain because tight muscles are sometimes the culprits.

**Ice Your Pain**
Precisely when to grab an ice pack depends on the injury. If the pain is chronic, here's the best post-run sequence: Foam roll, static stretch, ice. But for acute pain, skip rolling and stretching, and ice immediately.

**Get Strong**
Two strength training sessions per week can improve running. A strong body improves biomechanics, which enables you to train harder and more effectively without increased injury risk. But strength training, especially if you're pushing weights, can be a hard workout, so separate those workouts from hard runs by at least a day. Less intense core and stability exercises (planks, bridges) are fine the day before hard running workouts and before or after an easy run.

**See a Therapist**
A weekly massage will help relieve muscular tightness. Regular massage addresses issues immediately, rather than having them develop over time. The ideal time to schedule one is 24 to 36 hours after a hard workout. If you have a race coming up, schedule a massage at least four days prior to your event. "A sports massage releases biological waste, which is a good thing, but it can leave the legs feeling heavy. A light massage post-race can feel good, but to really boost recovery, opt for an ice bath instead. Once race-induced muscle soreness has subsided (two to six days), a deep-tissue massage can help release tension.

**Immerse in Ice**
Your hard weekly workout—a long run, an interval session—produces inflammation; soaking in cold, icy water helps get rid of it and speed recovery. Follow these guidelines: roll and stretch chronic aches, then get in the tub. You might want to have a snack before you ice, or enjoy toast and coffee in the tub. When you eat, blood is diverted from your extremities to your stomach. This decreases blood flow to the tissues that you're trying to chill, which makes the ice bath more effective.

**Pop a Pill (or Don't!)**
Taking ibuprofen before a run or race helps ease pain, right? Wrong. "Taking NSAIDs before a run can cause kidney damage and increase the risk of hyponatremia [too much water, low sodium]," says Martin Hoffman, M.D., research director for Western States 100-Mile Endurance Run. While the risk for such effects is lower for shorter distances, studies show NSAIDs don't decrease muscle soreness or provide any other benefit. Take these painkillers infrequently, only after a run to reduce inflammation, and then only for a few days. "If you have chronic pain, don't mask it with drugs; address the underlying issues instead," Dr. Hoffman says.

**Shop for Shoes**
Ideally, you want to purchase a new pair of running shoes before they lose their effectiveness, which is around 300 to 500 miles. It's a big range but that's because you, not just the shoes, are part of the equation. If you land hard on your heels or are a big runner, you'll wear down a shoe faster than lighter runners or mid-strikers do. So go by feel; if the cushioning feels worn, it likely is. Or look at the sole. If the rubber on the side or bottom is worn, it's time for a new pair. The onset of more-than-usual aches can also signal that a new pair is in order (overdue, actually). If you need shoes before a race, get them a few weeks in advance to make sure they are the right fit.

## Combating Shin Splints

Shin splints are a beginning runner's worst nightmare. You make the commitment to exercise, and then bam! your shins are throbbing with every step. Shin splint pain commonly happens when runners are new to an exercise program. Shin splints are due to an imbalance between the muscles that lift the foot and those that pull it down. Over-striding, running too far too soon, and improper running shoes can be the cause of shin splints. Given you are wearing the right shoes for you, and if you cut back on distance, the shin splint pain should

eventually go away as you develop your shin muscles and adjust to your new exercise program. Here are a few tips to get you through the pain.

1. **Strengthen your calf muscles with exercises**: Toe Raises can help build the shin muscles and improve their flexibility so you can overcome shin splints. Also try writing the entire alphabet with one foot lifted in the air. Repeat with your other foot.
2. **Replace old shoes**: Shoe cushioning is exhausted every 300-500 miles, often long before the soles or uppers show wear. But these old, dead shoes can contribute to shin splints, as well as foot and leg fatigue. You may consider a more supportive foot bed or insole as well. The staff at Fleet Feet Sports can discuss this option with you.
3. **Alternate running days**: Run only every other day until the pain disappears. Try walking if running is too painful.
4. **Ice**: Ice your shins every night for 20 minutes and always ice after your workout.
5. **Warm-up before going fast**: Warm up walking at an easy pace for ten minutes before you begin any running.
6. **Stretch after warming up**: Stop and do your stretch routine, especially the legs, after your warm-up.
7. **Slow or stop if you feel shin splint pain**: If the pain does not go away quickly at a lower speed, end your run.

## Injury Protocol

Ouch! Oh no, you wake up Sunday morning after your Saturday run and your left heel is killing you. You take a few steps and feel like an 80 year old woman who did one too many Waltzes the night before. Or, you are out for your run and your knee progressively gets sorer. You start to walk and a sharp pain virtually stops you in your tracks. The dreaded sports injury. You ask, "What do I do now?"

Unfortunately, at some point during most runners lives they will get some sort of ailment which will slow down their training, if not stop it all together for a period of time. The most important thing to realize is if you listen to your body it will give you early warning signs that something is not right. In general it is important to stop running and rest your body if…

1. You have pain for longer than 7 days
2. As you run it gets more uncomfortable
3. There is obvious swelling to the sore area
4. You can pinpoint *exactly* where the pain is located
5. It effects your natural running form

Initial treatment to your injured area is **RICE**
**R- Rest**….stop running! Take a few days off (at least 2-3) and re-assess.
**I- Ice**….your sore area. Ice is the most natural anti-inflammatory around, and is easy to use on specific areas of the body. Ice massage is the preferred method. Take a paper cup and freeze water in it. Tear off the top and roll the tip of the ice cup over the injured area for 10-15 minutes. Do this at least 1x a day, preferably 3x a day.

**C- Compress**…the injury if there is swelling. Wrap the area tight enough for support, but not so tight it will cut off blood flow.
**E- Elevate**…the injured area. Try to keep your injured area off the floor, and ideally higher than your heart. This helps with circulation of blood flow and helps to minimize swelling.

When an injury occurs, and the above self-treatment does not provide complete relief, it is important that you get medical advice from a trained medical professional. Ideally, find a doctor who treats many of the runners in your area (ask the employees at Fleet Feet Sports for recommendations.) There are two types of doctor's deal with many of running related injuries:

**Podiatrists** treat ailments of the foot. They may also have experience with lower leg or knee injuries if they relate to the foot.

**Orthopedists** specialize in bones and muscles of the body. Often Orthopedists have a specialty practice in Sports Medicine.

Following the rules above should help you to get back on the road sooner than later if an injury should happen to you. Please do not be afraid to come into Fleet Feet Sports for help!

## APPENDIX Q

## Check-In Emails

*Experimental Groups*
Hello,

This is Paige from the Virtual 5K program. I have you down as starting week ---- on date. I've noticed that you haven't completed a module quiz since date. Are you still participating in the training for the virtual 5K? If you have dropped out, please let me know as soon as you can. Or, if you are not receiving my weekly emails with the link to the survey, please let me know.

Best,
Paige

*Control Groups*
Hello,

This is Paige from the Virtual 5K program. I have you down as starting week ---- on date, is that correct? I've noticed that you haven't completed a "weekly comprehensive survey" since date that are sent in the weekly emails. Are you still participating in the training for the virtual 5K? If you have dropped out, please let me know as soon as you can. Or, if you are not receiving my weekly emails with the link to the survey, please let me know.

Best,
Paige

**Appendix R**

**Completion Certificate**

## Appendix S

*Open Ended Behavioral Economic Questions*

| Question | Theme | N | % |
|---|---|---|---|
| *Challenges Completing Weekly Workout* | Weather | 4 | 80% |
| | Holidays | 2 | 40% |
| | Motivation | 2 | 40% |
| | Fatigue | 1 | 20% |
| *Most Helpful Part of the Program* | Weekly reminders | 2 | 40% |
| | Set schedule | 2 | 40% |
| *Part of Program to be Improved* | An actual 5K event | 1 | 20% |
| | Videos catered towards newly diagnosed MS participants | 1 | 20% |
| *Helpful Additional Resources or Information* | Distance tracking device | 1 | 20% |
| | Virtual/In-person training partner | 1 | 20% |
| *Most Challenging Part of 5K Training Program* | Scheduling to complete modules/training | 3 | 60% |
| | Energy | 2 | 40% |
| | Weather | 1 | 20% |
| *Overcoming Training Challenges* | Committing to the program | 3 | 60% |

| | | | |
|---|---|---|---|
| | Got a walking partner | 1 | 20% |
| *Proud Moments Throughout Participation in Program* | Completing the 5K | 5 | 100% |
| | Staying committed | 2 | 40% |
| *Biggest Accomplishment in Completing the Program* | Completing 5K | 4 | 80% |
| *Biggest Motivator in Participating and/or Completing the Program* | Personal Achievement | 3 | 60% |
| | Increasing personal health | 1 | 20% |

## Vita

Paige Nicole Bramblett was born in Winston-Salem, North Carolina. They graduated Brookwood high school in 2015 in Thomasville, Georgia. They graduated from College of Charleston in Charleston, South Carolina, in May 2019 with a Bachelor of Science degree in Exercise Science. In spring of 2022, they obtained a Master's from Appalachian State University in Exercise Science with a concentration in Research.

Throughout their time at ASU, they worked in three different labs conducting research and collaborating with other students and professors. They had a Graduate Assistant position in their first year, teaching an Anatomy Lab course. In their second year, they were awarded the Graduate Assistant Research Mentoring Program (GRAM). Before graduating they were awarded Beaver College of Health Sciences Exercise Science Graduate Student Award.